

**Before the
Federal Communications Commission
Washington, DC 20554**

In the Matter of)
)
Implementation of Section 6002(b) of the)
Omnibus Budget Reconciliation Act of)
1993)
)
Annual Report and Analysis of)
Competitive Market Conditions)
With Respect to Commercial Mobile)
Services)

FOURTH REPORT

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I. INTRODUCTION

A. Overview

In 1993 Congress created the statutory classification of Commercial Mobile Services¹ to promote the consistent regulation of mobile radio services that are similar in nature.² At the same time, Congress established the promotion of competition as a fundamental goal for CMRS policy formation and regulation. To measure progress toward this goal, Congress required the Federal Communications Commission ("Commission") to submit annual reports that analyze competitive conditions in the industry.³ This report is the fourth of the Commission's annual reports on the state of CMRS competition.

This report follows the same general structure as the *Third Report*.⁴ Since operators of different Commission-defined services are competing for customers against the providers of other types of services with increasing frequency, this report bases its analysis on a consumer-oriented view of wireless services by focusing on specific product categories, regardless of their regulatory classification. In some cases, this includes an analysis of offerings outside the umbrella of "services" specifically designated by the Commission as CMRS.⁵ However, because licensees of

¹ Commercial Mobile Services came to be known of by the Commission as the Commercial Mobile Radio Services, or "CMRS".

² The Omnibus Budget Reconciliation Act of 1993, Pub. L. No. 103-66, Title VI, § 6002(b), amending the Communications Act of 1934 ("*Communications Act*") and codified at 47 U.S.C. § 332(c) ("*1993 Budget Act*").

³ "The Commission shall review competitive market conditions with respect to commercial mobile services and shall include in its annual report an analysis of those conditions. Such analysis shall include an identification of the number of competitors in various commercial mobile services, an analysis of whether or not there is effective competition, an analysis of whether any such competitors have dominant share of the market for such services, and a statement of whether additional providers of classes or providers in those services would be likely to enhance competition." *1993 Budget Act* codified at 47 U.S.C. § 332(c)(1)(C).

⁴ Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Third Report*, 13 FCC Rcd 19746 (1998) ("*Third Report*"). The appendixes to the *Third Report* are not published in the FCC Record (*See* Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Third Report*, FCC 98-91 (rel. Jun. 11, 1998) ("*Third Report Appendixes*"). A combined copy of the *Third Report* and the *Third Report Appendixes* may be found on the Commission's Internet site: <<http://www.fcc.gov/Bureaus/Wireless/Reports/fcc98091.pdf>>.

⁵ For example, a number of companies provide mobile telephone, paging, and mobile data services using satellite-based networks. *See e.g.*, Section 0.

these other spectrum-based services often compete with CMRS providers, as well as with other providers of telecommunications services, the Commission believes that it is important to consider them in the analysis.

This report focuses on the three established wireless services that are most often associated with CMRS: mobile telephony,⁶ paging/messaging,⁷ and dispatch.⁸ As a fourth topic, the report also discusses the growing area of mobile data services.⁹ These four services are not as clearly delineated as their names imply. For example, some dispatch operators also offer mobile telephone services. In addition, many of the services discussed in the mobile data services section are actually provided by mobile telephone, paging/messaging, or dispatch operators who are leveraging those assets to enter the growing market for wireless data services. Therefore, while these product categories are used to provide structure for this wireless report, the Commission's view of operators is not limited by the categories in which this report places them.

B. Status of Competition

Several sectors of the CMRS industry have seen increased competition since the release of the *Third Report*. In the mobile telephony sector, broadband PCS and digital SMR operators have continued to aggressively deploy their networks. While these efforts have not resulted in bringing competition to as many new markets as last year,¹⁰ they have resulted in improved

⁶ This report defines the mobile telephone segment to include cellular, broadband Personal Communications Service ("broadband PCS"), and digital Specialized Mobile Radio ("SMR") operators.

⁷ This report defines the paging/messaging segment to include paging and narrowband Personal Communications Services ("narrowband PCS") operators.

⁸ This report uses the term "dispatch" as a term of convenience to refer to a wide variety of services. Operators provide commercial dispatch services using a number of Commission defined services. However, due to the lack of available information, this report limits most of its discussion of the dispatch sector to operators using 800 MHz SMR, 900 MHz SMR, and 220 MHz services. It should also be noted that this report's use of the term "dispatch" includes both CMRS providers (who offer customers interconnected service) and Private Mobile Radio Service ("PMRS") providers (who do not offer customers interconnected service, but do offer non-interconnected services).

⁹ The mobile wireless data industry encompasses a wide array of services ranging from data transmitted over one-way pagers to vehicle tracking from satellites to wireless Internet connections via portable computers or PDAs. Participants include both CMRS and non-CMRS providers, many of whom also offer services in the mobile telephone, paging/messaging, and dispatch sectors. However, because the sector is still evolving, the Commission believes it is appropriate to address mobile data services as a separate section.

¹⁰ Whenever possible, this report uses the most up to date information available to the Commission. Consequently, not all of the report's information is as of the same date. Whenever the report makes a comparison to figures from "last year" or the *Third Report*, it is referring to whatever comparable information was available at the

coverage and increased competition in areas where some level of competition had previously existed. The paging/messaging market continues to be highly competitive and paging carriers continue to face competition from an increasing number of operators in other wireless sectors. As stated in the *Third Report*, the completion of the 800 MHz SMR and 220 MHz spectrum auctions and the deployment of digital technology have led to a restructuring of the dispatch sector. Consequently, at this time, performing a meaningful competitive assessment would be difficult at best. Similarly, the mobile data sector remains in a developmental stage, making competitive assessments difficult. However, in the past year, the mobile data sector has seen no shortage of companies announcing plans to offer a wide variety of new products and services in the coming months and years.

C. Industry Development

During the 1990s, one of the dominant transformations in the telecommunications industry and in society in general has been the rise of wireless communications, bringing the benefits of mobility to an ever-increasing segment of the country. The information available in the year since the release of the *Third Report* shows that this trend is not abating. For example, the mobile share of the telecommunications industry continues to rise, with mobile services accounting for 14.3 percent¹¹ of the industry's 1997 revenues,¹² an increase over the 1996 figure of 12.2 percent of industry revenues. This increase is the result of steadily increasing subscriber penetration by mobile services. By the end of 1998, the combined domestic subscribership of the three established CMRS products mentioned above had grown to over 126 million units,¹³ a 17 percent increase over domestic subscribership in 1997. In 1998, the CMRS industry added

time of the release of the *Third Report*.

¹¹ All of the data in this report are taken from publicly available sources. These sources include: trade associations, securities analysts, company releases, filings with the Securities and Exchange Commission, newspaper and periodical articles, and certain materials made available to the Commission that were prepared by research companies and consultants that study various aspects of the wireless industry. The accuracy of the data from these materials, however, was not independently verified by the Commission. The inclusion of these data in this report does not constitute a representation or warranty by the Commission of their accuracy or completeness.

¹² Federal Communications Commission, Common Carrier Bureau, Industry Analysis Division, *Telecommunications Industry Revenue: 1997*, Tbl. 2 (Telecommunications Industry Revenue by Service) (Nov. 1998). The figures of 1996 have changed from those reported in the *Third Report* due to changes in the reporting methodology used by the Common Carrier Bureau.

¹³ It is likely that there is some amount of overlap in subscribership between these three services. This figure is the sum of the subscribership figures for mobile telephony (taken from Appendix B), paging/messaging (equaling the average of the subscribership figures cited in the Paging/Messaging section), and dispatch (taken from Appendix D).

over 18 million new subscribers for the fourth consecutive year.¹⁴

Mobile Telephony. Since the release of the *Third Report*, the mobile telephony sector of CMRS experienced another year of strong growth and competitive development. In the twelve months ending December 1998, the mobile telephony sector generated over \$33 billion in revenues,¹⁵ increased subscribership from 55 million to 69.2 million,¹⁶ and produced a national penetration rate of nearly 26 percent.¹⁷ In addition, new entrant wireless providers¹⁸ have continued to deploy their networks. While the new entrant network buildout and coverage has not caught up to that of cellular, there are now at least five mobile telephone operators in each of the 35 largest Basic Trading Areas¹⁹ ("BTAs") and at least three mobile telephone providers in 97 of the 100 largest BTAs in the continental United States.²⁰ Finally, because of growing competition in the marketplace, it appears that the average price of mobile telephone service has fallen substantially during the year since the *Third Report*, continuing the trend of the last several years.²¹

¹⁴ As compared with the figures from *Third Report*, FCC Rcd at 19750.

¹⁵ See Appendix B, Table 1, p. B-2.

¹⁶ *Id.*

¹⁷ The penetration rate is calculated by dividing total subscribers by the country's total population. The 26 percent figure is based on a 1998 United States population estimate of 269.3 million. See Dennis Leibowitz et al, THE WIRELESS COMMUNICATIONS INDUSTRY, Donaldson, Lufkin & Jenrette, Winter 1998/1999, at 18. ("*DLJ Report*")

¹⁸ For the purposes of this analysis, the new entrants in each mobile telephone market are defined as being either operators using broadband PCS spectrum, or Nextel Communications, Inc. ("Nextel") in the areas where it has launched its digital mobile telephone service.

¹⁹ Basic Trading Areas ("BTAs") are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the Personal Communications Industry Association. BTAs are geographic areas drawn based on the counties in which residents of a given BTA make the bulk of their shopping goods purchases. Rand McNally's BTA specification contains 487 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission added additional BTA-like areas for: American Samoa; Guam; Northern Mariana Islands; San Juan, Puerto Rico; Mayagüez/Aguadilla-Ponce, Puerto Rico; and the United States Virgin Islands.

²⁰ See Appendix H, Map 1, at H-2. These figures assume that both cellular telephone operators have coverage in some part of all of these BTAs. This assumption is based on a Commission analysis of its cellular telephone tower database. However, this does not mean that the cellular operators necessarily have complete geographic coverage in BTAs. See *Third Report Appendixes*, at H-2.

²¹ See Section 0 for a detailed discussion.

Paging/Messaging. While the paging/messaging sector has continued to grow since the release of the *Third Report*, the industry is in the process of restructuring by moving away from a "subscriber growth at any cost" strategy and toward improved financial performance. In 1998, several analysts estimated that the number of pagers in service range from 50.5 to 54.2 million units, as compared to 48.2 million in 1997.²² Some of the effects of this focus on improving operating results can be seen by comparing subscriber growth with revenue growth. One analyst estimates that total 1998 paging revenues will increase by nearly 20 percent compared to 1997, almost double the growth rate of subscribers.²³ Paging carriers are attempting to enhance their operating results by offering advanced messaging services with narrowband PCS spectrum, as well as by offering value-added services over traditional one-way pagers.

Dispatch. The past year has seen a continuation of the trends discussed in the *Third Report*. Once again, dispatch subscribership grew by half, and Nextel Communications, Inc. ("Nextel") converted systems used for analog dispatch services to higher priced digital mobile telephony services. In addition, the Commission completed auctions of 220 MHz and the upper bands of the 800 MHz SMR spectrum which may provide new competition in the traditional dispatch market.

Mobile Data. The mobile data sector remains in a developmental stage, making competitive assessments difficult. However, in the past year, the mobile data sector has seen numerous companies announcing plans to offer a wide variety of new products and services in the coming months and years.

II. THE CMRS INDUSTRY

A. Mobile Telephony

For the purposes of this report, the mobile telephone sector includes all operators that offer commercially available interconnected mobile phone services. These operators provide access to the public switched telephone network ("PSTN") via mobile communication devices employing radiowave technology to transmit calls. Currently, this sector is dominated by providers using three types of FCC licenses: cellular radiotelephone, broadband PCS, and SMR.²⁴ While all three of these FCC services were created at different times and for different purposes, they now are used to offer mobile telephone services that may be interchangeable for many users.

²² See Section 0.

²³ Appendix C, Table 1, p. C-2.

²⁴ As codified at 47 C.F.R. § 22.900, 47 C.F.R. § 24.200, and 47 C.F.R. § 90.601, respectively.

Furthermore, while providers use different marketing techniques and different technologies to differentiate themselves to the public, they are offering essentially the same product -- mobile telephone services.

The discussion below begins with an overview of the mobile telephone market, which is divided into sections for cellular operators, broadband PCS operators, the digital SMR provider Nextel Communications, other SMR operators, resellers, and satellite providers.

1. Mobile Telephone Overview and Analysis

a. Mobile Telephone Sector Structure and Performance

In 1998, subscriber growth in the mobile telephone sector continued the trend of the past several years. As of December 1998, the market had over 69.2 million subscribers,²⁵ an increase of 25 percent over the 55.3 million subscribers reported in the *Third Report* for December 1997. In numerical terms, this is the largest 12-month increase in the history of the mobile telephone sector. This level of subscribership translates into nearly 26 percent of the country's population.

It is also interesting to note that the growth rate of the sector's net-new subscribers increased significantly. In 1996 and 1997, the number of new subscribers increased by less than ten percent each year. However, the 13.9 million new subscribers added in 1998 was 23 percent more than the 11.3 million subscribers added in 1997. In fact, 1998 was the first year new subscribers increased by more than 20 percent since 1994.

The financial performance of the mobile telephone sector continued to be strong. In 1998, the mobile telephone sector's annual total service revenue was over \$33 billion,²⁶ an increase of 20.5 percent over the twelve months ending December 1997. It is also the first time in the history of the mobile telephone sector that annual service revenues exceeded \$30 billion.

As the Commission found in the *Third Report*, the average monthly wireless telephone bill has continued to decline, reflecting increasing penetration in market sectors with lower average usage and, consequently, lower monthly bills.²⁷ While the price plans aimed at these market segments have higher per minute rates than plans aimed at high usage customers, their lower monthly flat-rate charges do serve to expand the number of consumers who can afford to

²⁵ See Appendix B, Table 1, p. B-2.

²⁶ *Id.*

²⁷ *Third Report*, 13 FCC Rcd at 19765.

subscribe to mobile services. The average monthly bill (often referred to as average revenue per unit, or "ARPU") declined from \$42.78 in December 1997 to \$39.43 in December 1998.²⁸ However, as was reported in the *Third Report*,²⁹ monthly bills associated with digital mobile telephone services are higher than the market average.³⁰

In terms of licenses and potential coverage, the structure of the mobile telephone industry has not changed significantly since the release of the *Third Report*. Except for movement by SBC Communications, Inc. ("SBC") and ALLTEL, Corp. ("ALLTEL"), the nation's current list of top mobile telephone operators³¹ by population coverage looks similar to the list completed last year.³² At the top are three carriers with national footprints,³³ followed by carriers with larger regional footprints, then carriers with smaller service areas or local footprints.

However, a list of the mobile telephone industry's top 25 operators by subscribership demonstrates the rising importance of non-cellular mobile telephone operators.³⁴ At the end of 1997, approximately seven percent of the subscribers on the top 25 list were on broadband PCS or digital SMR networks. By the end of 1998, this figure had doubled to 14 percent. In addition, at the end of 1997, there were only three pure broadband PCS or digital SMR operators in the top 25. At the end of 1998, there were six, including two in the top 10.

While the non-cellular mobile telephone operators have made significant inroads into the mobile telephone sector, they are still a relatively small portion of the whole sector. According to one estimate, at the end of 1998, cellular operators had approximately 86 percent of mobile telephone subscribers, while broadband PCS had nearly ten percent and digital SMR had more than four percent.³⁵ However, it is important to note that there are specific geographic markets in which

²⁸ See Appendix B, Table 1, p. B-2.

²⁹ *Third Report*, 13 FCC Rcd at 19765.

³⁰ For example, Bell Atlantic Corp. has reported that its digital cellular subscribers are generating ARPUs of over \$80 per month. Bell Atlantic Corp., *DigitalChoice/SingleRate*, (visited Mar. 30, 1999) <<http://www.bellatlantic.com/invest/news/990303/sld020.htm>>.

³¹ See Appendix B, Table 3, p. B-4.

³² See *Third Report Appendixes*, at B-5.

³³ "Footprint" is an industry term of art referring to the total geographic area in which a wireless provider can offer services.

³⁴ See Appendix B, Table 4, p. B-6.

³⁵ See *DLJ Report*, at 18.

the non-cellular operators have achieved market share greater than the national average. For example, according to one analyst, there are more than half a dozen markets in which broadband PCS and digital SMR operators have combined market share of more than 25 percent.³⁶

b. Major Operational Trends

Rise of Digital. It is possible that 1998 will become known in the mobile telephone industry as the year that digital technology began to take precedence over analog systems. During 1998, the number of customers subscribing to digital services increased by 160 percent from approximately 7.7 million to 20 million.³⁷ At the same time, there was only a 3.4 percent increase in the number of analog subscribers. At the end of 1998, digital subscribers made up 29 percent of the industry total, up from 14 percent at the end of 1997.

During the year, all four of the competing digital technologies³⁸ at least doubled their subscribership. At the end of 1998, TDMA was the most used technology, with approximately eight million subscribers.³⁹ Next largest was CDMA with over six million subscribers, followed by iDEN and GSM with 2.9 million and 2.7 million subscribers respectively. It is also worth noting that CDMA subscribership increased almost 360 percent during the year, compared to the 111 percent increase in TDMA subscribership. The broadband PCS operator Sprint PCS added 836,000 CDMA customers in the fourth quarter of 1998 alone.⁴⁰

Digital-One-Rate. The most dramatic change in the mobile telephone industry since the release

³⁶ See The Personal Communications Industry Association's Reply Comments, at Attachment A, p. 4, 1998 Biennial Regulatory Review--Spectrum Aggregation Limits for Wireless Telecommunications Carriers, WT Docket No. 98-205; Cellular Telecommunications Industry Association's Petition for Forbearance From the 45 MHz CMRS Spectrum Cap; Amendment of Parts 20 and 24 of the Commission's Rules -- Broadband PCS Competitive Bidding and the Commercial Mobile Radio Service Spectrum Cap, WT Docket No. 96-59; Implementation of Sections 3(n) and 332 of the Communications Act Regulatory Treatment of Mobile Services, GN Docket No. 93-252.

³⁷ See Appendix B, Table 5, p. B-7.

³⁸ The four technologies are: Code Division Multiple Access ("CDMA"), Global System Mobile Communications ("GSM"), integrated Digital Enhanced Network ("iDEN"), and Time Division Multiple Access ("TDMA"). There is also a fifth technology called Personal Access Communications System ("PACS"). 21st Century Telesis, Inc. is planning to use PACS with its C, D, and F block broadband PCS licenses. PACS is a low-power microcell technology which its proponents believe can be installed at a lower cost than the other, high-power, broadband PCS technologies. See 21st Century Telesis II Inc., Form 10-K, Sep. 30, 1998.

³⁹ See Appendix B, Table 5, p. B-7.

⁴⁰ Sprint Announces Record Fourth Quarter, Yearly Results, News Release, Sprint Corp., Feb. 2, 1999.

of the *Third Report* has been the widespread adoption of what are often referred to as "digital-one-rate" ("DOR") price plans, named after the first such plan marketed by AT&T Corp. ("AT&T"). While the details of various operators' plans differ, they generally include some combination of the following: bundles of large quantities of minutes for a fixed monthly rate that translated into at a low per-minute price; no long distance charges when used on the operator's network; no roaming charges when used on the operator's network;⁴¹ reduced roaming charges when off the operator's network; and, in some cases, no extra roaming charges anywhere.

The first prominent DOR plan was introduced by AT&T in May 1998.⁴² Under AT&T's plan, customers purchase one of three large bundles of minutes: 600 minutes for \$89.99; 1,000 minutes for \$119.99; or 1,400 minutes for \$149.99.⁴³ For these prices, customers do not have long distance or roaming charges anywhere in the country, regardless of whether the calls are placed on or off AT&T's network. All calls would cost between \$0.10 and \$0.15 per minute, depending on the plan, regardless of where they were placed (users must pay a higher rate for any additional minutes beyond those provided with the plan). Since most roaming agreements cost operators more than \$0.10 per minute, AT&T would absorb any roaming charges above that point.⁴⁴

Since AT&T's announcement, a large number of the major mobile telephone operators, such as Sprint PCS, Bell Atlantic Corp. ("Bell Atlantic"), and AirTouch Communications, Inc. ("AirTouch"), have initiated plans of their own that are all variations on AT&T's original concept, either on a nationwide or regional basis.⁴⁵

During the second half of 1998, consumer response to DOR plans appears to have been strong. For example, AT&T reported that it added 850,000 DOR subscribers by the end of the year⁴⁶ and

⁴¹ In other words, the user's home area for phone use is expanded to include the operator's entire network.

⁴² See *AT&T Launches First National One-Rate Wireless Service Plan*, News Release, AT&T Corp., May 7, 1998.

⁴³ *Id.*

⁴⁴ Cynthia M. Motz and Robert J. Hordon, *Wireless Update: AT&T's New Digital One Rate*, Equity Research - Americas, Credit Suisse First Boston, May 11, 1998, at 1.

⁴⁵ The Yankee Group, *Year-End 1998 Wireless Industry Update: The Impact of All-Inclusive Rates*, WIRELESS/MOBILE COMMUNICATIONS GLOBAL, Report, Vol. 2, No. 46, Dec. 1998, at 8.

⁴⁶ *AT&T's Fourth Quarter Operational Profits Were \$1.00 Per Share, an Increase of 45 Percent*, News Release, AT&T Corp., Jan. 25, 1999. At the end of the third quarter of 1998, AT&T reported that over two-thirds of customers signing up for the DOR plan were new subscribers to AT&T mobile telephone services. See AT&T Corp., AT&T EARNINGS COMMENTARY, *Third Quarter Operational Earnings Were \$1.00 Per Share, Up 67%*, Jan.

continues to add 100,000 new DOR subscribers per month.⁴⁷ AT&T also reported that during the 1998, minutes-of-use by customers in its cellular license areas had increased by 29.5 percent over 1997.⁴⁸ In addition, Bell Atlantic added nearly 400,000 digital subscribers during the fourth quarter of 1998 and attributed its growth to these DOR-type plans.⁴⁹

Wireless/Wireline Competition: Wireless Attacking the Second Line. In the past year, mobile telephone carriers, and most often broadband PCS operators, have begun to use a variety of methods to target homes with wireline-based second telephone lines. This strategy is especially prevalent among broadband PCS operators with licenses in rural or smaller urban areas. Since broadband PCS spectrum does not propagate as far as cellular spectrum, broadband PCS operators must spend more capital than cellular operators to cover the same area.⁵⁰ To contain costs, some broadband PCS operators in rural areas limit their coverage to urban centers and the roads connecting them, and impose roaming fees on users who travel outside of these areas. This coverage differential has pushed broadband PCS operators in these markets to find additional ways to promote their wireless services. Because the digital technology used by broadband PCS systems can replicate many of the features of wireline phones and analog cellular networks cannot, many broadband PCS operators in these areas are promoting their services as replacements for second telephone lines in homes or businesses.

One of the first broadband PCS operators to attempt this strategy was WirelessNorth, an operator with licenses in North Dakota, South Dakota, and Minnesota. According to press reports, WirelessNorth felt that the low number of POPs in its mostly rural areas meant that it could not compete with analog cellular as a strictly mobile service.⁵¹ Instead, it introduced a price plan⁵² designed to compete with wireline providers for residential second telephone lines.⁵³ As of

25, 1999, at 6. ("AT&T Third Quarter")

⁴⁷ AT&T Third Quarter, at 6.

⁴⁸ AT&T Corp, 1998 ANNUAL REPORT (1999), at 40.

⁴⁹ *Strong Telecom and Wireless Volumes Drive Double-Digit Bell Atlantic Earnings Growth*, News Release, Bell Atlantic Corp., Jan. 27, 1999.

⁵⁰ MULTIMEDIA TELECOMMUNICATIONS ASSOCIATION, 1998 MULTIMEDIA TELECOMMUNICATIONS MARKET REVIEW AND FORECAST (1998), at 135.

⁵¹ Karissa Todd, *The Road to Local Competition*, WIRELESS REVIEW, Nov. 30, 1998, available at 1998 WL 8999406.

⁵² See Third Report, 13 FCC Rcd at 19777.

⁵³ Karissa Todd, *The Road to Local Competition*, WIRELESS REVIEW, Nov. 30, 1998, available at 1998 WL

November 1998, 40 percent of WirelessNorth's customers used this plan.⁵⁴ Other rural broadband PCS operators base their marketing on a similar theme. For example, Panhandle Telecommunications Systems, Inc., in Liberal, Kansas, describes its service as enhancing convenience near town, as well as providing a second line when a user is on-line with a computer.⁵⁵ In Montana, Blackfoot Communications promotes its service as "the new cordless, go-anywhere Digital PCS service."⁵⁶

There are also examples of operators starting to combine special pricing plans with marketing plans to further appeal to the second line market. These pricing plans are similar to the DOR plans discussed above in that they have large, or unlimited bundles of minutes, but they do not have the reduced roaming and large home area features. AT&T has been running a trial for such a plan in Plano, Texas with approximately 100 participants.⁵⁷ In this trial, customers can place and receive an unlimited number of calls in Plano and Dallas for only \$39.99 per month.⁵⁸ For this price, customers also receive 30 free minutes for usage outside of Plano.⁵⁹ One operator, Chase Telecommunications Holdings, Inc. ("Chase"), has taken this concept out of the trial stage and into active use. Chase has started offering unlimited local calls in Chattanooga, Tennessee for \$29.99 per month.⁶⁰ Customers using this plan cannot roam outside of Chattanooga and must use a prepaid calling card for long distance calls.

Some larger broadband PCS licensees have gone a step further by acquiring broadband PCS licenses in addition to their cellular holdings, specifically to create services that would act as an add-on to existing landline services. For example, Century Telephone Enterprises, Inc.

8999406.

⁵⁴ *Id.*

⁵⁵ Panhandle Telecommunications Systems, Inc., *What Is genuine PCS?* (visited Jan. 24, 1999) <http://www.ptsi.net/what_is_genuine_pcs.htm>.

⁵⁶ Blackfoot Communications, *Digital PCS Service* (visited Jan. 24, 1999) <<http://www.blackfoot-telephone.com/communications/servicemain.html>>.

⁵⁷ Linda J. Mutschler and Paul Wuh, *The Next Generation III*, Comment - United States - Telecommunications/Cellular, Merrill Lynch & Co., Mar. 11, 1999, at 3.

⁵⁸ *Id.*

⁵⁹ *Id.* There is also a plan which includes 300 minutes outside of Plano for \$59.99 per month.

⁶⁰ *Leap Wireless International Launches Cricket Service Introducing 'Comfortable Wireless' for all Users*, News Release, Leap Wireless International, Inc., Mar. 17, 1999.

("Century") acquired D and E block broadband PCS licenses in areas where it already had cellular licenses. This overlap allowed it to offer two types of wireless services. Century uses the traditional cellular network for its high mobility customers.⁶¹ For residential customers, it is using broadband PCS licenses to create a service called "The Zone Phone," which it describes as "the perfect second line."⁶² To date, Century has launched this service in Grand Rapids, Kalamazoo, and Lansing, Michigan.⁶³ The coverage is limited to areas around each of these cities and allows customers to use the phone in their homes, neighborhoods, and around town. For a price of \$39.99 per month this plan offers users 1,000 minutes of use while in these urban areas.⁶⁴ The handsets have the ability to roam on the cellular network, at a higher price, when outside of the designated Zone Phone areas.

US WEST, Inc. ("US WEST") is implementing a similar strategy. However, its new service is designed to enhance its own wireline service, while Century's is trying to compete with the wireline services of other companies. While it was selling its cellular-based operations to AirTouch, US WEST was deploying a broadband PCS-based mobile telephone service called Advanced PCS.⁶⁵ US WEST designed its network so that its wireline customers could integrate wireless service into a single package, marketing it as a "home phone to go."⁶⁶ Advanced PCS allows customers to have the same telephone number and voice mail box for both a residence and a mobile handset, and have the usage of both charged on the same bill.⁶⁷

⁶¹ Nancy Gohring, *The Zone Hits Home: CenturyTel Seeks to Untether Residential Users*, TELEPHONY, Aug. 24, 1998, available in 1998 WL 6611643.

⁶² Century Telephone Enterprises, Inc., *What is the Zone Phone?* (visited Feb. 23, 1999) <<http://www.centurytel.com/zone/html/what.htm>>.

⁶³ Century Telephone Enterprises, Inc., *Where Can I Buy the Zone Phone?* (visited Jun. 15, 1999) <<http://www.centurytel.com/zone/html/where.htm>>.

⁶⁴ Century Telephone Enterprises, Inc., *What is the Zone Phone?* (visited Feb. 23, 1999) <<http://www.centurytel.com/zone/html/what.htm>>.

⁶⁵ US WEST first launched Advanced PCS in Denver in September of 1997. See *U S WEST Delivers First-In-The-Nation Service Giving Customers The Convenience Of Home Or Office Phone "To-Go,"* News Release, US WEST, Inc., Sep. 23, 1997.

⁶⁶ Joanna Bean, *Sprint PCS Dials Into Colorado Springs, Colo., Wireless Market*, KNIGHT-RIDDER TRIBUNE BUSINESS NEWS: THE GAZETTE, COLORADO SPRINGS, COLO., Nov. 20, 1998, available in 1998 WL 16349555.

⁶⁷ US WEST, Inc., *Life's Better When You're in Control* (visited Jan. 24, 1999) <<http://www.uswest.com/com/customers/pcs/2home.shtml>>.

Consolidation. 1998 saw a continuation of the process of license consolidation in the mobile telephone sector discussed in the *Third Report*.⁶⁸ In 1998, three of 1997's top 25 operators in subscribership consolidated with other carriers.⁶⁹ Furthermore, if deals announced since the release of the *Third Report* are completed, five additional operators that were in the top 25 at the end of 1998 will be consolidated into other carriers.⁷⁰

One of the driving forces behind many of these consolidations has been the desire of large regional carriers to enhance their ability to compete effectively with national operators like AT&T, Sprint PCS, and Nextel. As was discussed in the *Third Report*, operators with larger footprints can achieve economies of scale and increased efficiencies compared to operators with smaller footprints.⁷¹ The need for this increased size was exacerbated in the past year by the introduction and success of AT&T's DOR plan and, in particular, its low-cost roaming feature. According to analysts, it can be significantly more expensive for regional operators to provide customers with this feature than for national operators.⁷² One obvious way for an operator to reduce roaming costs is by acquiring licenses covering as much of the country as possible.

In addition to the domestic consolidation activity, the year since the release of the *Third Report* has seen an increased interest by foreign companies in domestic mobile telephone carriers. This interest has taken the form of investments, mergers, and potential joint ventures. The most prominent of these actions has been Vodafone Group Plc's proposed merger with AirTouch, that,

⁶⁸ See *Third Report*, FCC Rcd at 19766.

⁶⁹ AirTouch's merger with US West Media Group's domestic cellular interests (See *Airtouch and MediaOne Group Complete \$6 Billion Merger*, News Release, AirTouch Communications Inc., Apr. 6, 1998); ALLTEL merger with 360° Communications Co. (See *ALLTEL, 360° Complete \$6 Billion Merger*, News Release, ALLTEL Corp., Jul. 1, 1998); SBC's acquisition of Southern New England Telecommunications Corp. (See *SBC Communications Completes Southern New England Telecommunications Merger*, News Release, SBC Communications Inc., Oct. 26, 1998).

⁷⁰ ALLTEL merger with Aliant Communications, Inc. (See *ALLTEL Announces Merger Agreement With Aliant Communications Inc.*, News Release, ALLTEL Corp., Dec. 18, 1998); SBC's merger with Ameritech Corp. and acquisition of Comcast Corp.'s cellular operations (See *SBC Communications and Ameritech to Merge*, News Release, SBC Communications, Inc., May 11, 1998 and *SBC Communications Announces Plans To Acquire Comcast Cellular Corporation*, News Release, SBC Communications, Inc., Jan. 20, 1999); Bell Atlantic Corp.'s merger with GTE Corp. (See *Bell Atlantic and GTE Agree To Merge*, News Release, Bell Atlantic Corp., Jul. 28, 1998); AT&T's merger with Vanguard Cellular Systems, Inc. (See *AT&T acquires Vanguard Cellular Systems*, News Release, AT&T Corp., May, 3, 1999).

⁷¹ See *Third Report*, 13 FCC Rcd at 19766.

⁷² Linda Runyon Mutschler and Paul Wuh, *The Impact of Digital One Rate*, Equity Research, Merrill Lynch & Co., Nov. 12, 1998, at 17.

if completed, will create a company covering nearly one billion people in 23 countries.⁷³ Aerial Communications, Inc. was the recipient of a \$200 million investment by the Finnish telecommunications company, Sonera Ltd.⁷⁴

Prepaid. The use of prepaid billing plans has been on the rise in the mobile telephone sector. Under these plans, customers purchase a handset and a specific number of minutes. When those minutes have been used, the phone will no longer function until the customer purchases additional minutes. As was discussed in the *Third Report*, operators hope to use these plans to gain access to a whole new group of potential customers who lack the proper credit rating.⁷⁵ Operators also can use prepaid service to market to other groups like the budget conscious business and residential users and others who want to limit mobile telephone spending (e.g., parents who are purchasing mobile phones for their children). Without the need for credit checks, operators can also greatly expand their distribution channels beyond their retail storefronts.

The use of prepaid plans has yet to have the dramatic effect in the overall United States market that it appears to have had in Europe.⁷⁶ However, a number of the regional broadband PCS operators have reported that prepaid users are having an increasing impact on their operations. For example, Powertel, Inc. ("Powertel") reported that at the end of 1998, almost 14 percent of its broadband PCS subscribers were using prepaid plans. Moreover, Powertel subsequently reported that at the end of the first quarter of 1999 27,000 of its 43,000 net new subscribers were on prepaid plans,⁷⁷ raising its percentage of prepaid customers to 20 percent. Similarly, Aerial Communications, Inc. reported that 21 percent of its customers at the end of the first quarter of 1999 were on prepaid plans⁷⁸

3G. International Mobile Telecommunications-2000 ("IMT-2000") is an initiative of the

⁷³ See *Vodafone and Airtouch to Merge*, News Release, Airtouch Communications, Inc., Jan. 15, 1999.

⁷⁴ See *Sonera Ltd., Completes \$200 Million Investment in Aerial Communications Inc.*, News Release, Aerial Communications, Inc., Sep. 8, 1998.

⁷⁵ See *Third Report*, 13 FCC Rcd at 19775.

⁷⁶ Linda J. Mutschler and Paul Wuh, *The Next Generation III*, Comment - United States - Telecommunications/Cellular, Merrill Lynch & Co., Mar. 11, 1999, at 3.

⁷⁷ *Powertel, Inc. Announces First Quarter 1999 Financial Results*, News Release, Powertel, Inc., Apr. 29, 1999.

⁷⁸ *Aerial Communications Reports Strong First Quarter Operational Improvements, Record Customer Ratings and Lower Costs*, News Release, Aerial Communications, Inc., Apr. 15, 1999.

International Telecommunication Union ("ITU") seeking to integrate the various satellite and terrestrial wireless systems, both fixed and mobile, currently being deployed and developed under a family of standards to promote global service capabilities and interoperability after the year 2000. These systems are known as third generation or 3G systems.⁷⁹ In addition to providing the capability for higher wireless data rates by 3G systems,⁸⁰ IMT-2000 also articulates several key goals and objectives upon which potential 3G standards will be evaluated.

Some of the key service objectives include: enhanced voice quality, ubiquitous coverage, service provision at a reasonable prices, increased network efficiency, new voice and data capabilities, and an orderly evolution path from second generation to 3G systems to protect investments in second generation system investments.⁸¹

In 1998, proposals for IMT-2000 air interfaces were submitted to the ITU. The ten terrestrial proposals were primarily based on existing TDMA and CDMA technologies, thereby facilitating evolution of second generation systems. In early 1999, based on input from the global wireless community, the ITU recommended that IMT-2000 should be developed to encompass both TDMA and CDMA. The ITU also recommended that multiple operating modes of TDMA and CDMA should be supported to allow easy evolution of second generation systems, including the three systems used in the U.S. for PCS and cellular, and to meet varying marketplace needs.

One of the important IMT-2000 issues requiring resolution was negotiations to harmonize two of the more prominent proposed CDMA standards, wideband CDMA and cdma2000. In March 1999, the two primary supporters behind these two proposals reached an agreement settling a dispute over intellectual property rights, making it more likely the two standards could be combined into a single, multi-mode standard.⁸² In June 1999, an Operators Harmonization Group ("OHG"), consisting of major service providers from the U.S., Europe, China, Japan, Korea, Canada, and elsewhere, developed a technical framework for combining these

⁷⁹ The first generation of this technology was the original analog cellular networks first deployed in the early 1980's. The second generation came in the form of the digital cellular and broadband PCS networks that operator's began to deploy in the mid-1990's.

⁸⁰ The proposed standard calls for 144 kilobits per second at mobile speeds, 384 kilobits per second at pedestrian speeds, and 2 megabits per second in fixed locations. See The Personal Communications Industry Association, *Market Demand Forecast for Terrestrial Third Generation (IMT-2000) Services for the Personal Communications Industry Association* (visited Apr. 28, 1999) <<http://www.pcia.com/wireres/3gstudy.htm>>.

⁸¹ *Id.*

⁸² See *Ericsson and Qualcomm Reach Global CDMA Resolution*, News Release, LM Ericsson and Qualcomm Inc., Mar. 25, 1999.

proposals.⁸³ The OHG framework outlines further standards work that must be completed to enable terminals to operate in different CDMA modes efficiently. This technical work and international spectrum planning are important elements in having 3G systems provide global roaming and reduce the cost for multimode handsets. The ITU has endorsed this framework, and encouraged standards developers throughout the world to develop the necessary standards by the end of 1999. The ITU also intends to adopt its final recommendations on the radio aspects of IMT-2000 by the end of 1999.

While there are currently no 3G networks in commercial deployment, hardware manufacturers and service providers have been engaged in several trials of various 3G technologies. For example, Sprint Corp. and Northern Telecom recently performed a demonstration of cdma2000 technology⁸⁴ and LM Ericsson has reportedly been building demo systems using wideband CDMA.⁸⁵

c. Market Entry by New Competitors

To track the progress of new operators entering mobile telephone markets, the Commission has compiled a list of Basic Trading Areas ("BTAs") with some level of coverage by new mobile telephone providers.⁸⁶ This list is based on publicly-available sources of information released by the operators such as news releases, filings made with the Securities and Exchange Commission, and coverage maps available on operators' Internet sites. Data from these sources were used because the Commission's rules do not require new entrant licensees to file buildout information with the Commission.

There are several important caveats to note when using these data. First, to be considered as having "coverage," only a portion of a BTA needs to be covered. Second, multiple operators

⁸³ *Wireless Operators Announce Agreement on Globally Harmonized Third- Generation (G3G) Code Division Multiple Access Standard*, News Release, Operators Harmonization Group, June 8, 1999.

⁸⁴ *See Sprint, Nortel Networks Demonstrate High-Speed Wireless Internet*, News Release, Northern Telecom Limited, Apr. 28, 1999.

⁸⁵ Jennifer B. Malapitan, *Pace-Setting 3G Wireless, Here Sooner With W-CDMA*, METROPOLITAN COMPUTER TIMES, Nov. 5, 1998, available in 1998 WL 20718488.

⁸⁶ For the purposes of this analysis, the new entrants are defined as being either operators using broadband PCS spectrum or Nextel in the areas where it has launched its digital SMR product. As with the *Third Report*, Nextel's digital product is included as the sole SMR competitor because the Commission does not possess any information on where other SMR operators are competing with cellular and broadband PCS operators. *See Third Report*, 13 FCC Rcd at 19768.

shown in the same BTA are not necessarily providing service to the same areas. Consequently, some of the BTAs included in this analysis have only a small amount of coverage from a particular provider, possibly resulting from the buildout of a neighboring market.⁸⁷ Third, the POPs figures in this analysis include all of the POPs in a BTA with coverage. Fourth, because of the third point, this analysis overstates the total coverage in terms of both geographic areas and populations covered. Fifth, all population figures are based on the 1990 census.

Since the *Third Report*, new entrants have made significant progress in building out their networks. To date, over 335 BTAs, containing over 241 million POPs, have at least one new entrant offering service in some portion of the BTA.⁸⁸ This coverage represents more than 95 percent of the nation's total POPs. In gross terms, this increase is not a tremendous change from the level of deployment described in the *Third Report*.⁸⁹ The total number of BTAs increased by 23 percent, but most of these BTAs have smaller populations. Hence, the total POPs in the covered BTAs increased by only ten percent.

However, operators have added significantly to the levels of competition in BTAs where other new entrants already were in service. Last year, there were no BTAs with five new entrants in service. This year, there are eight BTAs with five new entrants.⁹⁰ When the existing incumbent cellular operators are taken into account,⁹¹ the ten million people in these BTAs may have up to seven mobile telephone operators from which they can choose, assuming all of the operators

⁸⁷ The Commission's buildout rules for geographic area licenses do not require operators to deploy networks such that the entire geographic area of a specific license receives coverage. For example, the construction requirements for 30 MHz broadband PCS licenses (blocks A, B, and C) state that an operator's network must serve an area containing at least one-third of the license area's population within five years of the license being granted and two-thirds of the population within ten years. See 47 C.F.R. § 24.203(a). Similarly, the construction requirements for 10 MHz broadband PCS licenses (blocks D, E, and F) state that an operator must cover one-quarter of a license area's population, or provide "substantial service," within five years of being licensed. See 47 C.F.R. § 24.203(b). The details concerning exactly which geographic areas or portions of the population should be covered to meet these requirements are left to the operators. In addition, decisions about whether to increase coverage above these requirements are left to the operators. For information on the buildout requirements for cellular licenses, see 47 C.F.R. § 22.946, § 22.947, § 22.949, and § 22.951.

⁸⁸ See Appendix B, Table 2A, p. B-3.

⁸⁹ See *Third Report Appendixes*, at B-4.

⁹⁰ The eight BTAs are Phoenix and Tucson, Arizona; Gainesville, Jacksonville, Tampa, and Lakeland, Florida; and Seattle and Bremerton, Washington.

⁹¹ As was mentioned in the Introduction, this analysis assumes that both cellular operators have at least some coverage in all BTAs.

have full geographic coverage in each BTA. In addition, the number of areas with four new entrants increased from 13 BTAs, containing 25 million POPs, to 45 BTAs, containing 82 million POPs. Currently, BTAs containing approximately 74 percent of the population have at least five mobile telephone operators providing coverage in some portion of their area, up from 54 percent at the time of the *Third Report*.⁹²

Driven by the desire to maximize the market of potential customers as quickly as possible, the new entrants have been concentrating their deployment efforts on the more populous geographic markets. To show this, the Commission has divided the 493 BTAs into four quartiles (groups of equal size) by their total populations.⁹³ Of the BTAs in the top quartile (the 123 most populated BTAs), 120 have one or more new entrants providing service (including 99 of the top 100). The second quartile (the next 123 most populated BTAs) has 101 BTAs with some coverage, and the bottom two quartiles have only 65 and 50 BTAs, respectively, with coverage. Thus, the most rural BTAs are the least likely to be experiencing competition from new entrants.

d. Price Competition

As the Commission observed in the *Third Report*, it is difficult to identify sources of information that track mobile telephone prices in a comprehensive manner.⁹⁴ However, there are a number of reports and other data available indicating that the entrance of new competitors into this market is continuing to reduce prices.⁹⁵ Because these studies use different methodologies and market samples, their findings vary and are only comparable in the broadest terms. Nevertheless, the available evidence, taken together, makes it clear that the average price for mobile telephony has continued to fall substantially since the *Third Report* in the last year, continuing the trend of the last several years.

⁹² It is important to reiterate that the actual total population served by these systems is certainly lower than these total-BTA figures imply. According to one recent estimate, 57 percent of the population was covered by two or more broadband PCS operators (which is roughly equivalent to five mobile telephone operators). See Paul Kagan Associates, Inc., *PCS Markets and POPs*, WIRELESS MARKET STATES, Oct. 31, 1998, at 14. It is also important to note that estimates of actual coverage vary considerably. For example, the above referenced study placed the broadband PCS-based Code Division Multiple Access coverage at 179 million people. However, a more recent study by another analyst placed the same figure at a much lower level, 97 million people. See *CDMA Leads PCS Availability*, News Release, The Strategis Group, Mar. 30, 1999.

⁹³ See Appendix B, Table 2B, p. B-3.

⁹⁴ See *Third Report*, 13 FCC Rcd at 19769-19770.

⁹⁵ See *Third Report*, 13 FCC Rcd at 19769-19770.

For example, according to one study comparing mobile telephone prices in the second quarter of 1998 with the second quarter of 1997, the average price per minute decreased by 18 percent.⁹⁶ Included in this average were analog cellular price declines of 12 percent, digital cellular price declines of 23 percent and broadband PCS price declines of 18 percent.⁹⁷ A subsequent study by the same analyst tracking price changes in the 25 largest markets between the second and third quarters of 1998 indicated that prices generally continued to decline over that period.⁹⁸ The average price per minute of digital cellular plans declined by between 2.0 percent and 8.3 percent, depending on the number of minutes included with the plans.⁹⁹ Likewise, broadband PCS prices declined by between 2.9 percent and 6.9 percent.¹⁰⁰ At the same time, analog cellular prices were essentially unchanged, except for plans with large bundles of minutes, which increased by 5.0 percent.¹⁰¹

A report by another analyst that compared price changes between 1997 and 1998 had a slightly different view. According to this analyst, prices at lower usage levels (240 MOUs and 430 MOUs) did not change significantly between 1997 and 1998.¹⁰² However, at the 600 MOU level, the median average price per minute declined by over 20 percent between 1997 and 1998, which reflects strong competition for high-end customers.¹⁰³

While the most aggressive price competition has been occurring at the higher levels of usage, the past year has also seen continued price declines for customers with lower levels of monthly usage. For example, according to one analyst, at the usage level of 60 MOUs per month prices for digital cellular and broadband PCS decreased by two and three percent between the second

⁹⁶ *Yankee Group's Mobile Report Predicts Increased Usage, ARPU Stabilization, and Landline Displacement*, News Release, The Yankee Group, Oct. 5, 1998.

⁹⁷ *Id.*

⁹⁸ *See* The Yankee Group, *Year-End 1998 Wireless Industry Update: The Impact of All-Inclusive Rates*, WIRELESS/MOBILE COMMUNICATIONS GLOBAL, Report, Vol. 2, No. 46, Dec. 1998, at 5.

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *Id.*

¹⁰² David A. Freedman and Gregory H. Lundberg, *Wireless Telephony: Untethered Stories & Stats - 1998 Price Declines Less Jarring than 1997's*, Equity Research - Telecommunications, Bear, Sterns & Co., Feb. 1999, at 4.

¹⁰³ *Id.*

and third quarters of 1998.¹⁰⁴ Another analyst estimated that between 1997 and 1998, the average price at the 60 MOU usage level decreased by 11 to 15 percent.¹⁰⁵ One of the most visible signs of this competition is that the price per month of the entry level packages has dropped over the past few years, giving a wider segment of the population access to mobile telephone service. It is important to remember, the customers at this low usage level are still paying significantly more per minute than users at higher levels. For example, according to the first analyst mentioned in this paragraph, as of the third quarter of 1998, users at the 60 MOU level were paying two to three times more per minute than users at the 500 MOU level.¹⁰⁶

A new source of price information is the cellular telephone services component of the Consumer Price Index¹⁰⁷ ("Cellular CPI") produced by the United States Department of Labor's Bureau of Labor Statistics ("BLS").¹⁰⁸ In the 13 months between the end of December 1997 and the end of January 1999, the Cellular CPI decreased by 9.1 percent, which equates to an annualized rate of 8.4 percent. In comparison, during the same period of time, the local telephone services charges component increased by 2.2 percent, and the long distance telephone services charges component decreased by 0.1 percent. The overall consumer price index increased by 1.9 percent.

Another indication of the competitive pressures being exerted on mobile telephone prices can be seen in roaming charges. Traditionally, roaming was a very lucrative part of operators' businesses, with prices typically ranging between \$0.50 and \$1.00 per minute.¹⁰⁹ Moreover,

¹⁰⁴ See The Yankee Group, *Year-End 1998 Wireless Industry Update: The Impact of All-Inclusive Rates*, WIRELESS/MOBILE COMMUNICATIONS GLOBAL, Report, Vol. 2, No. 46, Dec. 1998, at 3.

¹⁰⁵ David A. Freedman and Gregory H. Lundberg, *Wireless Telephony: Untethered Stories & Stats - 1998 Price Declines Less Jarring than 1997's*, Equity Research - Telecommunications, Bear, Sterns & Co., Feb. 1999, at 7 and 19.

¹⁰⁶ See The Yankee Group, *Year-End 1998 Wireless Industry Update: The Impact of All-Inclusive Rates*, WIRELESS/MOBILE COMMUNICATIONS GLOBAL, Report, Vol. 2, No. 46, Dec. 1998, at 3.

¹⁰⁷ The Consumer Price Index ("CPI") is a measure of the average change over time in the prices paid by urban consumers for a fixed market basket of consumer goods and services. The basket of goods includes over 200 categories including items such as food and beverages, housing, apparel, transportation, medical care, recreation, education, and communications. The CPI provides a way for consumers to compare what the market basket of goods and services costs this month with what the same market basket cost a month or a year ago. Starting in December of 1998, this basket of goods included a category for cellular telephone services.

¹⁰⁸ All CPI figures discussed in this paragraph were taken from U.S. Department of Labor, Bureau of Labor Statistics databases found on the Bureau of Labor Statistics' Internet site <<http://www.bls.gov/sahome.html>>.

¹⁰⁹ Cynthia M. Motz, *DON'T HANG UP ON WIRELESS*, Equity Research - Americas, Credit Suisse First Boston

there usually were significant roaming administration charges and fees that were assessed in addition to the per minute usage charges. However, a number of carriers are reporting that DOR plans are beginning to exert downward price pressure on their roaming rates. During 1998, carriers have reported that even though DOR plans have encouraged increased roaming, they have also led to reductions in the negotiated roaming rate charged to customers.¹¹⁰ In order to remain competitive, carriers expect that they will continue to proactively renegotiate their reciprocal roaming rates between operators to reduce rates even further.¹¹¹

e. Consumer Response

Some of the statistics reported by mobile telephone operators, such as net new subscriber growth, churn, and minutes-of-use ("MOUs"), show the effectiveness with which the new entrants are providing competition in the mobile telephone market.

Net New Subscriber Growth. Since the launch of the first broadband PCS system in November 1995, broadband PCS operators and Nextel Communications have combined to take steadily increasing portions of the industry's subscriber growth.¹¹² In fact, this portion has now grown to the point where the share of growth for these new entrants far exceeds their share of the industry's total population of subscribers. During their first year of operations, the new entrants acquired between four and six percent of each quarter's new mobile telephone subscribers.¹¹³ By the third and fourth quarters of 1998, the new entrants were taking more than 45 percent of net new subscribers. Many analysts project that this trend will continue into 1999, and that the new entrants will start taking half of the industry's net new subscribers.¹¹⁴

Churn. Churn refers to the number of customers an operator loses over a given period of time. Mobile telephone operators usually express churn in terms of average percent churn per month. For example, an operator might report churn of two percent for a given quarter. In other words,

Corp., Sep. 16, 1997, at 44.

¹¹⁰ See, e.g., Vanguard Cellular Corp., Form 10-K, Dec. 31, 1998, at 22; United States Cellular Corp., Form 10-K, Dec. 31, 1998, at 16-17; AirTouch Communications, Inc. Form 10-K, Dec. 31, 1998, at 13; and Dobson Communications Corp., Form S-4, Feb. 2, 1999, at 56.

¹¹¹ See Airtouch Communications, Inc. Form 10-K, Dec. 31, 1998, at 13.

¹¹² See Appendix B, Table 6, p. B-8.

¹¹³ *Id.*

¹¹⁴ See *DLJ Report*, at 18.

on average, the operator lost two percent of its customers in each of the quarter's three months. Thus, in this example, the operator would lose 24 percent of its customers in a single year and would turn over its entire customer base in approximately four years.¹¹⁵ Given that churn measures the frequency with which subscribers switch operators, it is often used as an indicator of increasing competition.

The currently available data indicate that the recent entry into mobile telephone markets by broadband PCS and digital SMR operators has been accompanied by an increase in operators' churn levels. See Table 7 of Appendix B, which contains annual churn statistics for the four main publicly owned broadband PCS operators, a sample of cellular operators, and Nextel, the principal digital SMR operator.¹¹⁶ In 1998, broadband PCS operators had churn averaging approximately 4.2 percent, which was an increase from the 3.2 percent experienced in 1997. Some operators even experienced quarters with churn as high as 5.5 percent. While cellular operators have lower churn, usually at or below 2 percent,¹¹⁷ their churn levels have grown from 1.9 percent in 1996 to 2.0 percent in 1998. Historically, Nextel has kept its churn around 1.0 percent. However, its churn has risen from 1.0 percent in 1996¹¹⁸ to 1.3 percent in 1997¹¹⁹ to 1.8 percent in 1998.¹²⁰

Minutes-of-Use. One of the goals operators hoped to achieve by offering customers price plans with large bundles of low-price MOUs was to encourage increased overall usage of wireless

¹¹⁵ This assumes that each churned customer is a unique individual and that the same customers do not churn multiple times.

¹¹⁶ See Appendix B, Table 7, p. B-9.

¹¹⁷ A lower level of geographic coverage and a higher reliance on pre-paid subscribers are reasons most often given for the higher levels of churn experienced by the broadband PCS operators. See John M. Bensché and Briar Mewbourne, *The PCS Report - Coverage Initiated on the Personal Communications Services Industry*, Wireless Services, Lehman Brothers, Nov. 11, 1997, at 38. For example, for the fourth quarter of 1998, Omnipoint reported that its churn rate, 3.2 percent, was reduced to 2.5 percent if prepaid customers were excluded from the calculations. *Omnipoint Adds Over 100,000 Subscribers in Fourth Quarter*, News Release, Omnipoint Corp., Feb. 17, 1999.

¹¹⁸ Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 42.

¹¹⁹ Nextel Communications, Inc., Form 10-K, Dec. 31, 1997, at 38.

¹²⁰ Nextel Communications, Inc., Form 10-K, Dec. 31, 1998, at 40. Nextel's low churn has usually been attributed to its business-oriented customer base which uses the SMR-type services Nextel includes with traditional interconnected telephone service. David A. Freedman and Gregory H. Lundberg, *Nextel Communications, Inc. - Initiation of Coverage*, Equity Research, Bear Sterns, Jul. 30, 1997, at 10.

services.¹²¹ Since, as mentioned above, much of the most active price competition has been occurring in digital services, both cellular and broadband PCS, it has been anticipated that MOUs would increase on digital services.¹²² As was reported in the *Third Report*,¹²³ the average number of minutes used each month by customers subscribing to digital services have in fact been at higher levels than MOUs of analog subscribers, which traditionally use about 100 minutes per month. Almost all of the broadband PCS operators are reported to have usage between 300 and 375 MOUs per month.¹²⁴ One cellular operator, Bell Atlantic, reported that in the fourth quarter of 1998 its digital cellular subscribers averaged 325 MOUs, which was three times the MOUs of its analog customers.¹²⁵ Nextel reported that in the fourth quarter of 1998 its digital SMR subscribers averaged approximately 400 MOUs.¹²⁶ Partly due to overall price decreases as well as the increased adoption of digital services, average MOUs for the industry as a whole are increasing. According to one analyst, average MOUs reached 143 per month per subscriber in 1998, an increase of 43 percent from 1996.¹²⁷

¹²¹ See e.g., *AT&T Launches First National One-rate Wireless Service Plan*, News Release, AT&T Corp., May 7, 1998.

¹²² It is also likely that some portion of the higher MOUs seen on digital plans is a result of existing high volume customers shifting over from their older, analog plans.

¹²³ See *Third Report*, 13 FCC Rcd at 19771.

¹²⁴ The Yankee Group, WIRELESS/MOBILE COMMUNICATIONS GLOBAL, *Year-End 1998 Wireless Industry Update: The Impact of All-Inclusive Rates*, Report, Vol. 2, No. 46, Dec. 1998, at 8.

¹²⁵ *Bell Atlantic Mobile's Growth Fueled by Popularity of Single Rate Plans*, News Release, Bell Atlantic Corp., Jan. 27, 1999.

¹²⁶ *Nextel Reports 1998 Results*, News Release, Nextel Communications, Inc., Feb. 23, 1999.

¹²⁷ *Good News for Mobile Phone Industry - Minutes of Use Are On the Uptick The Bad News - So is Churn*, News Release, The Strategis Group, Inc., Nov. 10, 1998.

f. Factors Affecting Growth and Competitive Development

(1) Coverage by Technology Type

As described above, digital technologies are quickly emerging as a driving force within the mobile telephone industry. Further, for many mobile telephone operators improving their digital footprint is a high priority. Cellular operators still have license areas that need the improved capacity and increased service offerings brought by digital technology. In addition, as was discussed in the *Third Report*, broadband PCS and digital SMR operators need to expand their footprints to increase their competitiveness with analog cellular services.¹²⁸ Consequently, one of the key factors affecting the mobile telephone industry in the coming years will continue to be the deployment of the various types of digital technologies.

To estimate the current deployment status of the four main digital mobile telephone technologies in use today (CDMA, TDMA, GSM, and iDEN), the Commission has made maps of each technology combining the coverage by all of the different mobile telephone operators.¹²⁹

CDMA. Both cellular and broadband PCS operators use CDMA technology in their networks.¹³⁰ To date, CDMA has been launched in at least some portion of license areas¹³¹ with approximately 208 million people, which is approximately 82 percent of the U.S. population.¹³² Included in these areas is broadband PCS coverage in 210 BTAs containing 200 million people and cellular coverage in 148 MSAs and RSAs containing 145 million people.

¹²⁸ See *Third Report*, 13 FCC Rcd at 19784.

¹²⁹ See Appendix H, Maps 2, 3, 4, and 5, at p. H-3 to H-6.

¹³⁰ The broadband PCS-based coverage is estimated using BTAs and the cellular-based coverage is estimated using Metropolitan Statistical Areas ("MSAs") and Rural Service Areas ("RSAs"). There are several important caveats to note when using these data. First, to be considered as having "coverage," only a portion of a license area needs to be covered. Consequently, some of the license areas included in this analysis have only a small amount of coverage from a particular provider, possibly resulting from the buildout of a neighboring market. Second, the POPs figures in this analysis include all of the POPs in a license area with coverage. Third, because of the second points, this analysis overstates the total coverage in terms of both geographic areas and populations covered. Fourth, because BTAs usually cover larger geographic areas than MSAs and RSAs, digital coverage on broadband PCS systems can appear to be greater than digital cellular coverage, when that is not necessarily the case. Fifth, all population figures are based on the 1990 census.

¹³¹ See Appendix H, Map 2, p. H-3.

¹³² See Appendix B, Table 8, p. B-10.

TDMA. Cellular and broadband PCS operators also both use TDMA technology.¹³³ To date, TDMA has been launched in at least some portion of license areas¹³⁴ containing approximately 191 million people, which is 76 percent of the U.S. population.¹³⁵ Included in these areas is broadband PCS coverage in 48 BTAs containing 68 million people and cellular coverage in 293 MSAs and RSAs containing over 163 million people.

GSM. In the United States, only broadband PCS operators are deploying GSM. To date, GSM has been launched in at least some portion of 231 BTAs containing 174 million people, or approximately 69 percent of the U.S. population.¹³⁶

iDEN. The analysis of iDEN coverage is limited to the largest digital SMR provider, Nextel. While Nextel is not the only provider using iDEN,¹³⁷ it is the only one for which detailed coverage information is available. To date, Nextel has launched iDEN-based service in at least some portion of 187 BTAs, containing over 191 million people, or approximately 76 percent of the U.S. population.¹³⁸

(2) Multi-Mode Handsets

As was discussed in the *Third Report*, handsets that are capable of using multiple technologies and multiple spectrum bands are used by digital operators to increase coverage for their customers.¹³⁹ Such handsets are most often used to allow digital customers to roam on analog cellular networks when outside their digital coverage areas. One major development since the *Third Report* is the announcements by some equipment manufacturers that they will soon start shipping a "tri-mode" CDMA handset. Similar to a TDMA-based handset used by AT&T, these CDMA handsets will allow users to access CDMA networks in broadband PCS spectrum bands, plus both analog and CDMA networks in cellular spectrum bands.¹⁴⁰ This handset will allow

¹³³ The caveats associated with the CDMA estimates are applicable to TDMA as well.

¹³⁴ See Appendix H, Map 3, p. H-4.

¹³⁵ See Appendix B, Table 8, p. B-10.

¹³⁶ See Appendix B, Table 8, p. B-10 and Appendix H, Map 4, p. H-5.

¹³⁷ See Traditional Dispatch Services section below, Sec. 0.

¹³⁸ See Appendix B, Table 8, p. B-10 and Appendix H, Map 5, p. H-6.

¹³⁹ See *Third Report*, 13 FCC Rcd at 19785.

¹⁴⁰ See *Nokia Presents New Products at CTIA Wireless '99*, News Release, Nokia Corp., Feb. 8, 1999.

broadband PCS and cellular customers to access the features of digital handsets when in areas covered by the other spectrum block. This handset will also allow cellular carriers that use CDMA technology to expand their network capacity by combining 10 MHz broadband PCS licenses with their existing cellular licenses.¹⁴¹ On the other hand, an integrated handset allowing broadband PCS GSM customers to roam on analog cellular networks is still not available.¹⁴²

2. Cellular Sector Analysis

During the 1970s, the Commission licensed 50 MHz of spectrum in the 800 MHz frequency band for two competing cellular systems in each market (25 MHz for each system). These licenses are divided into 305 MSAs and 428 RSAs, plus a market for service in the Gulf of Mexico, for a total of 734 geographic license areas.

a. Cellular Sector Structure and Performance

The structure of the cellular sector has not changed significantly since the release of the *Third Report*¹⁴³ in that the largest operators are mostly Bell Operating Companies ("BOCs"), inter-exchange carriers, or entities that have been spun off from one of those two (e.g., AirTouch).¹⁴⁴ At the end of 1998, there were two cellular carriers with more than seven million subscribers and two more with more than six million subscribers. At the end of 1997, only the two largest carriers had more than six million subscribers.

One notable trend in the performance of cellular operators is the effect broadband PCS operators have had on cellular subscriber growth. This impact is most noticeable when analyzing the growth of penetration rates of the cellular operators. In the years preceding the launch of broadband PCS and digital SMR, cellular operators usually increased their penetration rates by

¹⁴¹ For example, last year AirTouch acquired broadband PCS E block licenses in Bakersfield, Los Angeles, and San Diego, California and Las Vegas and Reno, Nevada from Rivgam Communicators, L.L.C. See "Wireless Telecommunications Bureau Commercial Wireless Service Information," *Public Notice*, Report No. LB-98-44, (rel. May 29, 1998). All of these are areas where AirTouch has at least some level of ownership in one of the existing cellular licenses. See Appendix I.

¹⁴² There are examples of GSM operators who use an extra adapter that permits roaming using GSM handsets. See *Powertel Launches Dual-Mode Wireless Service*, News Release, Powertel, Inc., Dec. 14, 1998.

¹⁴³ See *id.*, 13 FCC Rcd at 19779.

¹⁴⁴ See Appendix B, Table 9A, p. B-11.

between one and two percentage points each year.¹⁴⁵ For example, cellular operators increased their penetration rates on average by 1.55 percent and 1.68 percent in 1995 and 1996 respectively. However, in 1997, the increase in cellular operators' average penetration rates dropped by 12 percent, down to 1.48 percent. In 1998, their increase in average penetration decreased again, down to 1.23 percent.

b. Response to Competition

The efforts of cellular operators, discussed in the *Third Report*,¹⁴⁶ to increase their capacity and expand their service offerings by deploying digital technologies has continued during the past year. To track these digital rollouts, the Commission has compiled a list of MSAs and RSAs with some level of digital coverage by the incumbent cellular operators. These data are based on information from operators, as well as on publicly available information released by the operators such as news releases, filings made with the Securities and Exchange Commission, and coverage maps available on operators' Internet sites. This analysis found that digital cellular services are available in over 375 MSAs and RSAs, which have a combined coverage of more than 202 million POPs, or approximately 80 percent of the nation's total population.¹⁴⁷

Recent reports by cellular carriers indicate that at least some of them have been successful both in gaining consumer acceptance of their digital services and in migrating a significant percentage of network usage to the digital portions of their networks, thereby relieving some of the pressures on the analog portion. For example, during 1998, AT&T, the nation's largest digital cellular operator, increased its digital subscriber total to approximately 4.35 million, an increase of 150 percent from 1.75 million at the end of 1997.¹⁴⁸ During 1998, SBC increased its TDMA subscribership from almost nothing to 660,000 and migrated 30 percent of the wireless minutes in its top markets to digital.¹⁴⁹ Bell Atlantic increased its digital subscribership six fold to

¹⁴⁵ See Appendix B, Table 9B, p. B-12.

¹⁴⁶ See *Third Report*, 13 FCC Rcd at 19780.

¹⁴⁷ See Appendix B, Table 8, p. B-10 and Appendix H, Map 6, p. H-7.

¹⁴⁸ AT&T increased its digital penetration rate from 29.3 percent (of 5,964,000 consolidated subscribers) to 60.5 percent (of 7,198,000 million consolidated subscribers). Both of these figures include subscribers on broadband PCS systems. See AT&T Corp., AT&T EARNINGS COMMENTARY, *AT&T's Fourth Quarter Operational Profits Were \$1.00 Per Share, an Increase of 45 Percent*, Jan. 25, 1999, at 7.

¹⁴⁹ SBC Communications Inc., *Investor Briefing, SBC Delivers 19.3 Percent Earnings Growth in 1998; Grows Fourth-Quarter Earnings 20 Percent*, No. 206, Jan. 21, 1999, at 6.

950,000 during 1998, and migrated 40 percent of busy-hour calls to digital.¹⁵⁰

3. Broadband PCS Sector Analysis

Broadband PCS is similar to cellular service, except that broadband PCS systems are designed to use a digital format. The Commission set aside 120 MHz between 1850 MHz and 1990 MHz for broadband PCS.¹⁵¹ This spectrum was divided into three blocks of 30 MHz each and three blocks of 10 MHz each. Two of the 30 MHz blocks are divided into 51 Major Trading Areas¹⁵² ("MTAs"). One of the 30 MHz blocks and all of the 10 MHz blocks are divided into 493 BTAs.¹⁵³

a. Broadband PCS Sector Structure and Performance

The broadband PCS sector is made up of one nationwide carrier, a number of other carriers that are constructing large regional networks of varying sizes, and carriers that are constructing networks more statewide or local in size. A number of these carriers are creating wireless systems based solely on their broadband PCS licenses. For example, Sprint PCS is creating a nationwide network, and Omnipoint Corp., Aerial Communications Inc., and Powertel, Inc. are building large regional systems. There are also operators, such as AT&T, SBC, and BellSouth

¹⁵⁰ *Strong Telecom and Wireless Volumes Drive Double-Digit Bell Atlantic Earnings Growth*, News Release, Bell Atlantic Corp., Jan. 27, 1999 and Bell Atlantic Corp., INVESTOR'S REFERENCE GUIDE 97 (1998), at 55.

¹⁵¹ The remaining 20 MHz of spectrum for unlicensed broadband PCS is allocated for short-range communications such as a local area networks in offices. These systems operate with very low power and have a limit on the duration of transmissions.

¹⁵² Major Trading Areas are Material Copyright (c) 1992 Rand McNally & Company. Rights granted pursuant to a license from Rand McNally & Company through an arrangement with the Personal Communications Industry Association. MTAs are combinations of two or more Basic Trading areas. Rand McNally's MTA specification contains 47 geographic areas covering the 50 states and the District of Columbia. For its spectrum auctions, the Commission added the following MTA-like areas: 1) Guam and the Northern Mariana Islands, 2) Puerto Rico and the United States Virgin Islands, and 3) American Samoa. In addition, Alaska was separated from the Seattle MTA into its own MTA-like area.

¹⁵³ In June 1998, as a result of WT Docket No. 97-82, broadband PCS C block licensees could elect to disaggregate their licenses and return 15 MHz of C block spectrum to the Commission. As a result, a number of licensees elected to disaggregate some or all of their licenses, creating new C block BTAs with seven spectrum licenses. See Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, WT Docket No. 97-82, *Second Report and Order and Further Notice of Proposed Rule Making*, 12 FCC Rcd 16436 (1997) and Amendment of the Commission's Rules Regarding Installment Payment Financing for Personal Communications Services (PCS) Licensees, WT Docket No. 97-82, *Order on Reconsideration of the Second Report and Order*, 13 FCC Rcd 8345 (1998).

Corp., for which broadband PCS networks are complements to their existing cellular holdings.

The past year has been one of strong growth for broadband PCS operators. Since the *Third Report*, a dozen new operators have launched systems, including the BOC Ameritech Corp., two of AT&T's joint ventures (Triton PCS, Inc. and Telecorp PCS, Inc.), and a number of smaller carriers.¹⁵⁴ During 1998, operators for whom there is publicly available information increased their subscribership by 255 percent to over six million.

b. Competitive Development

Given that the broadband PCS sector remains in its early stages of development, the most important variable affecting its ability to compete in the mobile telephone market is coverage. As discussed above, the primary short-term advantage held by the incumbent cellular sector is its extensive coverage. Many potential customers, especially business users, may have been hesitant to sign up for service until broadband PCS has adequate coverage. Thus, broadband PCS operators have made expansion of their footprints a primary focus.

To date, broadband PCS service has been launched in at least some portion of 320 BTAs containing nearly 229 million POPs.¹⁵⁵ While 46 percent of these 320 BTAs have only one broadband PCS operator, 111 BTAs have two PCS operators, 54 BTAs have three operators, and eight BTAs now have four operators. These 173 BTAs include 75 percent of the nation's POPs.

A view of the rollout of broadband PCS by license blocks shows that most of the activity has been in the A and B blocks, with 164 and 214 BTAs launched respectively.¹⁵⁶ C block operators have coverage in at least some portion of 35 BTAs with over 17 million POPs.

To show where the broadband PCS operators have been concentrating their deployment efforts, this report has divided the BTAs into quartiles by their total populations.¹⁵⁷ Of the BTAs in the top quartile (the 123 most populated BTAs), 119 have at least one broadband PCS operator providing some coverage. The second quartile (the next 123 most populated BTAs) has 94 BTAs with some coverage, and the bottom two quartiles have only 61 and 46 BTAs, respectively, with some coverage.

¹⁵⁴ See Appendix B, Table 10, p. B-16 and *Third Report Appendixes*, at B-16. For information about broadband PCS operators' financial statistics, see Appendix, B, Tables 11 and 12, p. B-17 and B-18.

¹⁵⁵ See Appendix B, Table 13A, p. B-19 and Appendix H, Map 7, p. H-8.

¹⁵⁶ See Appendix B, Table 13B, p. B-19.

¹⁵⁷ See Appendix B, Table 13D, p. B-20.

4. Other Competitors: Nextel Communications, Other Specialized Mobile Radio Operators, Resellers, and Satellite Operators

This section discusses several other types of operators that are competing in the mobile telephone segment: Nextel, other SMR operators, resellers, and satellite operators.

a. Nextel Communications, Inc.

For a number of years, another source of competition in mobile telephone markets has been SMR service. SMR was first established by the Commission in 1979 to provide land mobile communications on a commercial basis. While the primary use for SMR traditionally has been dispatch services,¹⁵⁸ SMR systems have always had the ability to offer "interconnected" service allowing access to the PSTN, but until recently have suffered from limited capacity.

Digital technologies have enabled SMR providers to become competitors in mobile telephone markets. As reported in the *Third Report*,¹⁵⁹ the operator most responsible for using digital technology to make SMR a mobile telephone competitor has been Nextel, with its deployment of Motorola, Inc.'s iDEN technology.¹⁶⁰ Nextel has combined various billings features, a near-nationwide footprint, and handsets that can be used for both interconnected service as well as traditional dispatch type services (called "Direct Connect") to create an offering targeted to business users.¹⁶¹

During the past year, Nextel has continued to develop its mobile telephone business. Nextel's network currently has coverage in more than 400 cities, including 92 of the top 100 markets.¹⁶² Nextel has continued to add customers at the rapid pace reported in the *Third Report*, adding over 1.5 million new digital customers since the *Third Report*.¹⁶³ Nextel also continues to record the highest ARPU levels in the mobile telephone industry, reaching as high as \$70 per subscriber

¹⁵⁸ See Section 0 for a discussion of the dispatch market.

¹⁵⁹ See *Third Report*, 13 FCC Rcd at 19786-19788.

¹⁶⁰ The only other SMR licensee known to the Commission to be using digital technology (Southern Company offers its Southern LINC service using an iDEN network) is more focused on the traditional dispatch market. See Section 0.

¹⁶¹ See Nextel Communications, Inc., Form 10-K, Dec. 31, 1998, at 3.

¹⁶² *Nextel Reports 1998 Results*, News Release, Nextel Communications, Inc., Feb. 23, 1999.

¹⁶³ See *Nextel Reports First Quarter Results*, News Release, Nextel Communications, Inc., Apr. 19, 1999.

per month.¹⁶⁴ In the third quarter of 1998, Nextel reported positive operating cash flow¹⁶⁵ for the first time for its domestic digital SMR operations.¹⁶⁶

Nextel also introduced new products and services designed to keep its digital SMR service competitive with other mobile telephone services. In September 1998, Nextel began to offer Motorola's i1000 handset. This device combines all of Nextel's existing services into a handset similar to Motorola's popular StarTac cellular phone.¹⁶⁷ Nextel stated that this handset would allow Nextel to extend its customer base to business owners, managers, and executives.¹⁶⁸ In addition, Nextel followed the trend of DOR price plans discussed above by introducing its Nextel National Business Plan in January 1999.¹⁶⁹ The plan offers 500 or 900 digital cellular minutes, for \$89.95 and \$129.95, respectively, that can be used anywhere on Nextel's network with no extra charge for long distance.¹⁷⁰ These developments were partly responsible for the steady shift in 1998 of Nextel's MOUs away from Direct Connect minutes and toward interconnected mobile telephone minutes. In the first quarter of 1998, mobile telephone minutes accounted for 33 percent of Nextel's total MOUs.¹⁷¹ By the fourth quarter of 1998, that figure rose to 45 percent.¹⁷²

As was mentioned in the *Third Report*, Nextel's technology is incompatible with cellular and broadband PCS networks, making it impossible to roam away from Nextel's network.¹⁷³ In an effort to accelerate the expansion of its iDEN coverage, Nextel recently proposed an affiliation

¹⁶⁴ *Nextel Reports 1998 Results*, News Release, Nextel Communications, Inc., Feb. 23, 1999.

¹⁶⁵ Operating cash flow equals earnings before interest, taxes, depreciation and amortization (often referred to as "EBITDA"). It is a commonly used measure to determine the financial performance of many wireless telecommunications operators.

¹⁶⁶ *Nextel Reports Third Quarter Results*, News Release, Nextel Communications, Inc., Oct. 15, 1998.

¹⁶⁷ *Nextel Unveils New Pocket-Sized Phone*, News Release, Nextel Communications, Inc., Sep. 8, 1998.

¹⁶⁸ *Id.*

¹⁶⁹ *Nextel Introduces National Rate Plan*, News Release, Nextel Communications, Inc., Jan. 6, 1999.

¹⁷⁰ *Id.*

¹⁷¹ Statement made by Nextel official during Nextel's fourth quarter 1998 earnings conference call, Feb. 23, 1999.

¹⁷² *Id.*

¹⁷³ *See Third Report*, 13 FCC Rcd at 19788.

agreement with Nextel Partners, Inc.¹⁷⁴ Under this agreement, Nextel Partners, Inc. agreed to build and operate iDEN-based SMR systems for Nextel.¹⁷⁵ This final completion of this agreement is pending approval of the license transfers.

b. Other Specialized Mobile Radio Operators

Traditionally, urban SMR operators had only a limited ability to offer mobile telephone services. This limitation has been due to a number of factors, including limited spectrum availability and the preclusion of spectrum reuse by traditional, analog high-power, single site transmitter systems employed by SMR operators.¹⁷⁶ In contrast, SMR operators in less spectrum-scarce, rural areas have faced fewer capacity difficulties and, consequently, have a greater ability to offer mobile telephone services.¹⁷⁷ For example, prior to its 1997 merger with Nextel, Pittencrieff Communications, Inc. focused on rural areas and presented its service as an alternative to cellular service.¹⁷⁸ As recently as 1996, SMR operators other than Nextel had several hundred thousand customers using interconnected service.¹⁷⁹

c. Resellers

Resellers offer service to consumers by purchasing air time at wholesale rates from facilities-based providers and reselling it at retail prices.¹⁸⁰ According to a survey performed by the National Wireless Resellers Association in 1997, the resale sector had between 100 and 120

¹⁷⁴ Nextel Partners, Inc., is a company created specifically to enter the mobile telephone industry by entering this affiliation agreement with Nextel. Its largest equity investors include: Nextel WIP Corp. (a wholly owned Nextel subsidiary), DLJ Merchant Banking Partners II, L.P., Eagle River Investments, L.L.C., Motorola, Inc. and Madison Dearborn Capital Partners II, L.P. See *Nextel Finalizes Agreements with Nextel Partners, Inc.*, News Release, Nextel Communications, Inc., Feb. 1, 1999.

¹⁷⁵ *Nextel Finalizes Agreements with Nextel Partners, Inc.*, News Release, Nextel Communications, Inc., Feb. 1, 1999.

¹⁷⁶ Nextel Communications, Inc., Form 10-K, Dec. 31, 1996, at 5.

¹⁷⁷ Pittencrieff Communications, Inc., Form 10-K, Dec. 31, 1996, at 4.

¹⁷⁸ *Id.*

¹⁷⁹ See *RCR Top 20 SMRs*, RCR RADIO COMMUNICATIONS, Feb. 10, 1997, at 14. This is the most recent Top 20 SMRs list published by RCR Radio Communications.

¹⁸⁰ *Interconnection and Resale Obligations Pertaining to Commercial Mobile Radio Services*, CC Docket No. 94-54, *First Report and Order*, FCC 96-263, 61 Fed. Reg. 38399 (Jul. 24, 1996), at paras. 10-11.

providers with a total of approximately two million mobile telephone subscribers.¹⁸¹ In 1998, the top 20 resale providers had over 1.1 million subscribers, which was almost unchanged from 1997.¹⁸² MCI Worldcom, Inc. is by far the largest reseller with over half of all the subscribers of the 20 largest resellers. In addition, MCI Worldcom, Inc.'s 1998 total of 565,000 customers is a slight decrease from MCI Communications Inc. and Worldcom Corp.'s combined, pre-merger total of 580,000. The remainder of the 20 largest resellers combined grew by only 4.2 percent between 1997 and 1998, well below the 24 percent growth rate for the mobile telephone industry as a whole.

d. Satellite Operators

On November 1, 1998, Iridium LLC ("Iridium") launched the first satellite-based hand-held, global satellite telephone system.¹⁸³ Iridium uses a constellation of 66 low earth-orbit satellites¹⁸⁴ to provide mobile telephone service from virtually any point on the globe. In urban areas, the system also offers users a cellular roaming service based on dual-mode phones that can be switched to operate with terrestrial wireless networks. Currently, Iridium's handsets can cost between \$3,000 and \$4,500,¹⁸⁵ and satellite-based calls typically cost between \$3 and \$6 per minute.¹⁸⁶

To date, it has been reported that Iridium has experienced difficulties gaining the initial operational results for which it had planned.¹⁸⁷ As a result of these difficulties, Iridium sought,

¹⁸¹ Anthony Bruno, *Resale Industry Rises to Meet Challenges of New Environment*, RCR RADIO COMMUNICATIONS REPORT, Aug. 4, 1997, at 11.

¹⁸² See Appendix B, Table 15, p. B-22.

¹⁸³ *The World's First Global Satellite Telephone and Paging Company Starts Service Today*, News Release, Iridium LLC, Nov. 1, 1998.

¹⁸⁴ Low earth orbit satellites (often referred to as "LEOs") are satellites placed into orbits only a few hundred miles above the surface of the earth (compared to traditional geostationary satellites that orbit approximately 22,300 miles above the earth). For example, Iridium's satellites are at an altitude of approximately 780 kilometers (approximately 484 miles) and circle the Earth approximately once every 100 minutes. See Iridium World Communications Ltd., Form 10-K, Dec. 31, 1997, at 12.

¹⁸⁵ Communications Daily, *Anemic Iridium Reports Only 10,294 Customers In Quarter*, Apr. 27, 1998.

¹⁸⁶ Charles Bickers, *Wired Skies: Satellite Phones Will Reach Places Cellphones Can't*, FAR EASTERN ECONOMIC REVIEW, Apr. 1, 1999, available in 1999 WL-FEER 8674730.

¹⁸⁷ COMMUNICATIONS DAILY, *Iridium Seen Likely to Break First-Quarter Debt Covenants*, Feb. 25, 1999.

and was granted, a 60-day extension,¹⁸⁸ plus a subsequent 30-day extension,¹⁸⁹ on covenants from creditors who hold \$800 million in Iridium's debt. These covenants originally called for the company to meet specific subscriber and revenue targets by the end of March 1999.¹⁹⁰

Several other satellite-based mobile telephone systems have announced plans to launch service during 1999 and 2000 to compete with Iridium. For example, Globalstar Telecommunications, Ltd. is currently planning to commence service in the third quarter of 1999,¹⁹¹ and ICO Global Communications expects to launch service in 2000.¹⁹²

B. Paging and Messaging

The paging/messaging industry continued to evolve during the year since the *Third Report*. As noted last year, many paging carriers have begun to refer to their products as "messaging services."¹⁹³ As used herein, messaging refers broadly to both traditional one-way paging services, as well as advanced services provided over narrowband PCS spectrum.¹⁹⁴

Historically, paging has been a one-way wireless radio-transmission using coded radio signals to activate a device that provides an audio, visual, or tactile indicator. Over time, one-way paging services have become fairly homogeneous,¹⁹⁵ and competition for the service is now

¹⁸⁸ Christopher Price, *Iridium Wins 60-Day Extension From Lenders*, FINANCIAL TIMES, Mar. 30, 1999, available at 1999 WL 3450672.

¹⁸⁹ *Iridium Receives 30-Day Extension From Lenders*, News Release, Iridium LLC, May 28, 1999.

¹⁹⁰ Christopher Price, *Iridium Wins 60-Day Extension From Lenders*, FINANCIAL TIMES, Mar. 30, 1999, available at 1999 WL 3450672.

¹⁹¹ Globalstar Telecommunications, Ltd., Form 10-Q, Sep. 30, 1998, at 10.

¹⁹² *ICO Reports 1998 Results*, News Release, ICO Global Communications, Feb. 17, 1999.

¹⁹³ *Third Report*, 13 FCC Rcd at 19790.

¹⁹⁴ The Commission auctioned regional and nationwide narrowband PCS licenses in 1994. The Commission noted that narrowband PCS can be used to provide services such as voice message paging, two-way acknowledgement paging and other data services. FCC, *FCC Auction - Regional Narrowband PCS - Fact Sheet* (visited Mar. 5, 1999) <<http://www.fcc.gov/wtb/auctions/mpcs/rnp1fact.html>>. Carriers often refer to such services as "advanced messaging services." SkyTel Communications Inc., Form 10-K, Dec. 31, 1998, at 1.

¹⁹⁵ *Third Report*, 13 FCC Rcd at 19808.

generally centered on price.¹⁹⁶ However, this view of the market is beginning to change. One analyst believes that the key drivers to future growth in the industry will include those service features that offer product differentiation such as advanced messaging and information services (transmitted over one-way and advanced messaging networks), as well as telemetry services.¹⁹⁷ The industry has also recognized this marketing shift. For example, 60 percent of the industry recently reached agreement on a set of service standards for transmitting Internet-based information to pagers.¹⁹⁸ The standards will permit customized information to be downloaded to customers and will allow paging providers to charge a premium for the service.¹⁹⁹ Carriers have also announced restructuring efforts that focus on improving financial performance rather than on increasing subscribers.²⁰⁰

This report's discussion of the paging/messaging industry begins with an analysis of the industry as a whole followed by information about specific service providers and, similar to the *Third Report*, includes information about consolidations and restructurings. The report also discusses innovative services that may contribute to the continued growth in the paging/messaging industry. The section concludes with industry projections and an assessment of competition.

1. Paging Industry Structure and Performance

In 1998, the paging industry experienced growth in both total subscribers and annual revenues.²⁰¹ Based on an analyst's 1998 estimate, 5 million new paging units (including one-way

¹⁹⁶ Analysts argue that paging is a commodity-based business. See Dennis Leibowitz, et. al., *THE WIRELESS COMMUNICATIONS INDUSTRY*, Donaldson, Lufkin & Jenrette, Spring 1998, at 30. A commodity is a product or service that is not highly differentiated and competition for the product or service is based on price.

¹⁹⁷ Jeanine Oburchay, *Wall Street Perspective: Is Paging a Lasting Application?*, *PAGINGNOW*, Dec. 10, 1998 <<http://www.pagingnow.com>>; See also *Wireless Messaging: A \$6.6 Billion Revenue Business in 1999*, *WIRELESS DATA & MESSAGING*, Jan. 31, 1999, at 4. Telemetry services are discussed in Appendix G.

¹⁹⁸ *Wireless Messaging Industry Prepares for Information Explosion*, News Release, Paging Network, Inc., Nov. 19, 1998. Eleven companies, serving more than 60 percent of the nation's approximately 50 million paging customers approved the standards. *Id.*

¹⁹⁹ *Id.*; *DLJ Report*, at 38.

²⁰⁰ See *Gains Too Modest To Assess Paging Industry's Shift In Marketing*, *COMMUNICATIONS TODAY*, Nov. 9, 1998, available in 1998 WL 17661712.

²⁰¹ Appendix C, Table 1, p. C-2, displays the total subscribers, annual revenues, and ARPU for the paging industry for the years 1995 through 1998. Appendix C also includes lists of public paging companies' revenues, EBITDA/operating cash flow, and EBITDA/operating cash flow margin. See Tables 2, 3, 4, and 5, pp. C-3 through C-6 respectively.

and advanced messaging units) were to be added for a total of 53.3 million paging units, an increase of more than 10 percent over 1997.²⁰² In contrast, another analyst forecasts 50.5 million units in service at year-end 1998, due in part to announcements by PageMart Wireless, Inc. ("PageMart") and Paging Network, Inc. ("PageNet") that they planned to report customer losses in the fourth quarter of 1998, totalling almost one percent of the industry.²⁰³ In fact, while PageNet previously announced it would lose 275,000 to 325,000 units in service, it actually lost 388,000 units.²⁰⁴

PageNet maintains its place as the largest U.S. paging carrier with almost 10 million subscribers. However, due to two large mergers, the second and third place carriers are much closer to PageNet's share of total subscribers.²⁰⁵ Based on 53.3 million subscribers, PageNet has 18.5 percent of total industry subscribers, Arch has 13.8 percent, and Metrocall, Inc. ("Metrocall") has 10.6 percent.²⁰⁶ A detailed discussion of consolidation activity is presented below.

Some of the effects of restructuring efforts can be seen by comparing the growth in total subscribers to the growth in industry revenues. Last year, one analyst forecast total 1998 paging revenues would be \$6.2 billion, an increase of nearly 20 percent over 1997, almost double the growth rate of subscribers.²⁰⁷ As a result of the difference in growth rates,

²⁰² THE STRATEGIS GROUP, THE STATE OF THE US PAGING INDUSTRY: 1998 (1998), at 14. ("Strategis Paging Report") Paul Kagan Associates, Inc. estimates 52.3 million paging units in service at year-end 1998. Paul Kagan Associates, Inc., *Wireless Messaging: A \$6.6 Billion Revenue Business in 1999*, WIRELESS DATA & MESSAGING, Jan. 31, 1999, at 4. The Yankee Group estimates 54.2 million paging units in service at year-end 1998. *PCIA Forecast*, at 5.

²⁰³ See *DLJ Report*, at 33, 39.

²⁰⁴ *PageNet Reports Quarterly and Annual Results; Company Reports Year Over Year Improvement Despite Restructuring*, News Release, Paging Network, Inc., Feb. 16, 1999; *Major Paging Carriers' Financials Take the Street by Surprise*, PAGINGNOW, Feb. 17, 1999 <<http://www.pagingnow.com>>.

²⁰⁵ See Appendix C, Table 2, p. C-3.

²⁰⁶ See *id.*

²⁰⁷ *Strategis Paging Report*, at 30. Paul Kagan Associates, Inc. also estimates \$6.2 billion in revenues in 1998. Paul Kagan Associates, Inc., *Wireless Messaging: A \$6.6 Billion Revenue Business in 1999*, WIRELESS DATA & MESSAGING, Jan. 31, 1999, at 4.

estimated 1998 ARPU is \$10.17 per month, up \$0.60 from 1997.²⁰⁸ A detailed discussion of revenue-enhancing innovative services is provided in Section 0 below.

2. Operational Trends

a. Industry Consolidations

As noted above, two major consolidations have been completed since the release of the *Third Report*, along with a number of smaller mergers. Analysts argue that such consolidation is necessary and will continue²⁰⁹ if paging is to survive, particularly in light of the large capital costs associated with building a narrowband PCS network. Some analysts have estimated that these capital costs are in the range of \$250 to \$400 million per nationwide network and have in total already exceeded \$1.8 billion for narrowband networks built to date.²¹⁰

Metrocall/AMD. In October, Metrocall acquired AT&T's Advanced Messaging Division ("AMD") and, in the process, also obtained one nationwide 50/50 KHz narrowband PCS license.²¹¹ Including the merger with ProNet, discussed in the *Third Report*,²¹² Metrocall is now the third largest paging carrier in the U.S. and serves more than 5.6 million customers.²¹³ In addition, as part of the agreement, AT&T will offer Metrocall's messaging services in all of its wireless stores for the next five years.²¹⁴

²⁰⁸ *Strategis Paging Report*, at 28. In the *Third Report*, the ARPU was reported at \$9.11 and was taken from estimates made by Strategis. Strategis has since revised the 1997 ARPU estimate to \$9.57. *Id.*

²⁰⁹ Jeanine Oburchay, *Wall Street Perspective: Is Paging a Lasting Application?*, PAGINGNOW, Dec. 10, 1998.

²¹⁰ Bill Menezes, *Paging Begins To Mature: Industry Moves To New Phase*, WIRELESS WEEK, Aug. 24, 1998, at 23; Paul Kagan Associates, Inc., *Narrowband PCS: Betting Heavily on the Future*, WIRELESS DATA & MESSAGING, Dec. 31, 1998, at 4.

²¹¹ See Grant Butler, *Metrocall Completes Purchase of AT&T Advanced Messaging*, NEWSBYTES NEWS NETWORK, Oct. 5, 1998, available in 1998 WL 20717068. AMD's other nationwide narrowband PCS license was sold to TSR Wireless, Inc. in an unrelated transaction. See *TSR Wireless Signals Plan for Major Presence in NPCS Market*, LAND MOBILE RADIO NEWS, Aug. 28, 1998, available in 1998 WL 6631792.

²¹² *Third Report*, 13 FCC Rcd at 19703.

²¹³ See Appendix C, Table 2, page C-3.

²¹⁴ See Grant Butler, *Metrocall Completes Purchase of AT&T Advanced Messaging*, NEWSBYTES NEWS NETWORK, Oct. 5, 1998, available in 1998 WL 20717068. Further, in January 1999, Metrocall announced that it will offer AT&T's Digital PCS and Digital One Rate offerings via its direct sales force. See Paul Kagan Associates, Inc., *Wireless Marketing Mentionables*, WIRELESS DATA & MESSAGING, Jan. 31, 1999, at 6.

Arch/MobileMedia. In August 1998, Arch entered negotiations to acquire MobileMedia, the fourth largest publicly-traded carrier, which would make Arch the second largest U.S. paging company with over seven million customers.²¹⁵ In the midst of the merger, MobileMedia announced plans to launch advanced messaging services by mid-year 1999, using its narrowband PCS licenses.²¹⁶ The Commission approved the merger in February 1999.²¹⁷ In April 1999, the U.S. Bankruptcy Court for the District of Delaware confirmed MobileMedia's proposed merger with Arch under its Chapter 11 bankruptcy plan of reorganization.²¹⁸ In June 1999, the acquisition was completed.²¹⁹

Other Mergers. Aquis Communications, Inc., ("Aquis") a privately-held company, was formed to acquire Bell Atlantic Paging and subsequently merged with Paging Partners Corporation.²²⁰ Following the acquisitions, Aquis was projected to have approximately 431,000 customers.²²¹ In August 1998, Vanguard acquired the operations and 70,000 customers of NationPage, which operated primarily in Pennsylvania and the upstate New York region.²²²

b. Industry Restructurings

The *Third Report* indicated that carriers were beginning to shift from a "subscriber growth-at-

²¹⁵ See *Arch Communications and MobileMedia in Negotiations for Merger*, BUSINESS WIRE, Aug. 19, 1998.

²¹⁶ See *MobileComm Readies for NPCS Promotion*, PAGINGNOW, Feb. 25, 1999 <<http://www.pagingnow.com>>. MobileComm is a wholly-owned subsidiary of MobileMedia Corporation. See *id.*

²¹⁷ In the Matter of MOBILEMEDIA CORPORATION, et. al. Applicant for Authorizations and Licenses of Certain Stations in Various Services, WT Dkt. No. 97-115, *Memorandum Opinion and Order*, Rel. Feb. 5, 1999.

²¹⁸ See *Court Confirms MobileMedia's Plan of Reorganization Clearing Way for Acquisition by Arch Communications Group*, News Release, Arch Communications Group, Inc., Apr. 12, 1999.

²¹⁹ *Arch Merges With MobileMedia*, News Release, Arch Communications Group, Inc., Jun. 4, 1999.

²²⁰ See *BAP Acquisition Corp. Announces New Company Name*, PR NEWswire, Dec. 28, 1998; See *Paging Partners Officially Changes Name*, PAGINGNOW, Apr. 6, 1999 <<http://www.pagingnow.com>>.

²²¹ See *AQUIS Completes Deal for Bell Atlantic Paging*, News Release, Aquis Communications, Feb. 17, 1999.

²²² *Vanguard Cellular Acquires NationPage*, BUSINESS WIRE, Aug. 5, 1998; The *Third Report* indicated that Vanguard acquired NationPage in December 1997. However, that was merely the announcement of a definitive agreement. *Third Report*, at 19793.

any-cost” strategy to a focus on revenue growth.²²³ Both PageNet and Arch, for example, have announced restructuring initiatives with accompanying layoffs and service price increases.²²⁴ One of the most dramatic impacts of this strategy was PageNet’s announcement that it lost 388,000 subscribers during the fourth quarter of 1998 due to subscriber terminations and inactive reseller accounts.²²⁵

3. Competitive Strategies

As was noted earlier in this section, analysts argue that, for paging to continue to experience growth, carriers will need to provide narrowband PCS services and/or information services. These services are being added or expanded in response to competition from other paging companies and other wireless sectors.

The digital technology employed by digital cellular, broadband PCS, and digital SMR providers allows two-way handsets to act as one-way pagers and advanced messaging devices.²²⁶ Analysts believe that these carriers will continue to attract paging customers.²²⁷ For example, a recent study by the Strategis Group states that almost one-fifth of potential turnover customers (based on a four percent churn level) are considering replacing their pagers with mobile phones.²²⁸ However, the same study showed an unwillingness among the 25 million users of both mobile phones and pagers to abandon their pagers.²²⁹ Analysts also are quick to delineate paging’s advantages over mobile phones, such as size, price (monthly paging bills are, on average, about one-fourth of the average mobile telephone bill²³⁰), in-

²²³ *Third Report*, 13 FCC Rcd at 19803.

²²⁴ *See Arch Joins the Restructuring Club*, INSIDE PAGING, Jun. 12, 1998.

²²⁵ *PageNet Reports Quarterly and Annual Results; Company Reports Year Over Year Improvement Despite Restructuring*, News Release, Paging Network, Inc., Feb. 16, 1999; *Major Paging Carriers’ Financials Take the Street by Surprise*, PAGINGNOW, Feb. 17, 1999 <<http://www.pagingnow.com>>.

²²⁶ *Third Report*, 13 FCC Rcd at 19801.

²²⁷ *See DLJ Report*, at 36.

²²⁸ *Customer Churn Stirs Up Paging Industry*, News Release, The Strategis Group, Nov. 5, 1998.

²²⁹ *Id.*

²³⁰ Average monthly revenue per paging unit was estimated to be \$10.17 in 1998 while the average local monthly bill for mobile telephones was estimated to be \$39.43. *See* Appendix C, Table 1, p. C-2 and Appendix B, Table 1, p. B-2.

building coverage, battery life, and unobtrusiveness.²³¹ Other analysts believe that as broadband PCS matures, it will be able to meet paging's advantages.²³² Other carriers also provide advanced messaging services in competition with paging/messaging providers, including ARDIS Company ("ARDIS"),²³³ BellSouth Wireless Data ("BWD")²³⁴ and ReadyCom, Inc.²³⁵ In 1998, analysts noted that once the form factor (*i.e.*, shape and size) and price of the messaging devices used by ARDIS and BWD decreases, and the distribution channels improve, the companies could provide more competition in advanced messaging.²³⁶ Since that analysis, a device one-half the size has been introduced²³⁷ and published prices for the messaging devices have fallen substantially.²³⁸ In addition, PageNet and BWD recently announced that PageNet will market BWD's service.²³⁹ American Mobile Satellite Corporation (owner of ARDIS) and SkyTel Communications, Inc. ("SkyTel") have entered a similar arrangement to resell each other's

²³¹ See *DLJ Report*, at 36.

²³² See Bruce Felps, *Geographic Signal Strength Helps Paging Keep Its Edge*, WIRELESS WEEK, Aug. 24, 1998, at 20.

²³³ Last year, Motorola sold the ARDIS Company to American Mobile Satellite Corporation which combined ARDIS' terrestrial network with the company's satellite-based network.

²³⁴ For a further discussion of these services, see Section 0.

²³⁵ ReadyCom Inc. ("ReadyCom") provides a two-way voice messaging service. ReadyCom's Responder service permits subscribers to reply, by voice, to incoming voice messages. See *ReadyCom Launches Responder Services in Raleigh/Durham, N.C.*, News Release, ReadyCom, Inc., Feb. 9, 1999. ReadyCom also offers Responder Plus which incorporates the ability to make live cellular telephone calls to as many as ten preprogrammed telephone numbers. It is marketed as a service that controls costs by limiting calling to select numbers. See *ReadyCom Develops Responder Plus Service for Cellular*, News Release, ReadyCom, Inc., Feb. 9, 1999.

²³⁶ See Antony Bruno, *Growth Rates Slowing As ARPU Starts Climbing*, RCR RADIO COMMUNICATIONS REPORT, Aug. 3, 1998, available in 1998 WL 8226791.

²³⁷ See *Research In Motion Unveils Next-Generation Inter@active Pager With Full Keyboard*, BUSINESS WIRE, Aug. 26, 1998.

²³⁸ An August 1998 report indicated that the Research In Motion Inter@Active Pager cost \$500. *Strategis Paging Report*, at 317. However, ARDIS and BWD currently offer the device for between \$249 and \$325 depending on the length of contract. BellSouth Wireless Data, *BellSouth Wireless Data - Interactive Pager Service - Promo 950* (visited Apr. 13, 1999) <<http://www.bellsouthwd.com/ips/buy/promo1.html>>; ARDIS, *RIM Interactive Pager* (visited Apr. 13, 1999) <<http://www.ardis.com/rim.html>>.

²³⁹ See *PageNet, BellSouth Wireless Data Enter Strategic Alliance to Expand Market for Interactive Paging, Other Two-Way Services*, News Release, BellSouth Wireless Data, Mar. 10, 1999.

products.²⁴⁰

A number of satellite providers offer one-way paging and advanced messaging services. In addition to the mobile telephone services discussed above in Section 0, Iridium launched its global paging and messaging service on November 17, 1998.²⁴¹ PageNet began offering Iridium's World Page Service in January 1999.²⁴² World Page Service is a one-way alphanumeric and numeric offering and when initially launched was priced at \$160 per month for a twelve month contract and \$500 for the paging device.²⁴³ At the end of the first quarter of 1999, Iridium reported 2,075 satellite paging customers.²⁴⁴ American Mobile Satellite Corporation ("American Mobile") and QUALCOMM Inc. ("QUALCOMM") offer advanced messaging services for trucking companies using geostationary satellite ("GEO") systems.²⁴⁵ Finally, ORBCOMM Global, L.P., a little low-earth operating satellite system, also offers two-way messaging.²⁴⁶

a. Narrowband PCS

The *Third Report* noted that four carriers had launched advanced messaging services using narrowband PCS spectrum.²⁴⁷ Many of these carriers continue to expand their footprints and

²⁴⁰ See *American Mobile and SkyTel Announce Strategic Alliance/Companies Agree to Pursue Joint Opportunities in Wireless Data Market*, News Release, American Mobile Satellite Corp., Apr. 7, 1999.

²⁴¹ Steve Gold, *Iridium Satellite-Based Paging/Messaging Service*, NEWSBYTES NEWS NETWORK, available in 1998 WL 20719014.

²⁴² *PageNet First to Offer Global Paging Coverage with New Service that Crosses Boundaries, Borders and Oceans*, News Release, PageNet, Jan. 27, 1999.

²⁴³ Antony Bruno, *PageNet Turns on Iridium Satellite Paging Service*, RCR RADIO COMMUNICATIONS REPORT, Feb. 1, 1999, at 3.

²⁴⁴ *Iridium Reports First Quarter Results*, News Release, Iridium LLC, Apr. 26, 1999.

²⁴⁵ See *Bishop Report*, at 90. American Mobile provides guaranteed message delivery for trucking companies over its satellite network, two-way messaging to customers over its ARDIS terrestrial system, and guaranteed messaging over a combination of its terrestrial and satellite networks. See *id.* GEO satellite systems operate at 22,300 miles above the earth. See HARRY NEWTON, NEWTON'S TELECOM DICTIONARY (14th ed. 1998), at 322.

²⁴⁶ ORBCOMM Global, L.P., Form 10-K, Dec. 31, 1998, at 4; See also *Bishop Report*, at 102. ORBCOMM's satellite constellation orbits between approximately 740 and 1000 kilometers above the Earth. ORBCOMM Global, L.P., Form 10-K, Dec. 31, 1998, at 13.

²⁴⁷ See *Third Report Appendixes*, at C-8.

launch new services.²⁴⁸ For example, SkyTel recently added text-to-speech capabilities over its two-way network.²⁴⁹ The subscriber composes the message and SkyTel's network converts it to digitized speech introduced by the sender's name.²⁵⁰ This year, SkyTel also began reselling its advanced messaging service via a "Local Partners" program to expand coverage and distribution to small- and medium-sized markets.²⁵¹ Under the agreement, ValuePage, Inc. will have the exclusive right to market SkyTel's advanced messaging services on a local basis beginning with Jackson and Vicksburg, Mississippi.²⁵² In addition to accessing a new group of potential customers, the agreement provides SkyTel with capital infusion from the partner for buildout in local areas.²⁵³ In June 1999, MCI WorldCom, Inc. announced it would acquire SkyTel.²⁵⁴

CONXUS Communications, Inc. ("CONXUS") initially launched Pocketalk, its voice messaging service, in November 1997. In December 1998, CONXUS began providing Pocketext, a guaranteed messaging service, in its Pocketalk northeast markets, with the other Pocketalk markets to follow.²⁵⁵ In addition to its voice messaging service launched in February 1997, PageNet launched its advanced text messaging service in the first quarter of 1999.²⁵⁶

PageMart is the newest entrant to provide services. It launched guaranteed messaging in June 1998 and now provides services in many cities throughout the country.²⁵⁷ PageMart plans to add

²⁴⁸ See Appendix C, Table 6, page C-7 for lists the services and associated number of subscribers for each of the four companies; Appendix C, Table 7, page C-8, for the estimated narrowband PCS rollouts by number of launches; Appendix C, Table 8, page C-9, for the current deployment status of narrowband PCS licensees; and, Appendix H, Map 8 for the current narrowband PCS coverage of the five carriers that have launched.

²⁴⁹ See Bruce Felps, *SkyTel Rolls Out Text-To-Voice Service*, WIRELESS WEEK, Jan. 4, 1999, at 36. For a discussion of SkyTel's telemetry services, see Appendix G.

²⁵⁰ See *id.*

²⁵¹ See SkyTel's "Local Partners" Program to Enhance Distribution: Company Signs First Agreement with ValuePage, News Release, SkyTel Communications Inc., Feb. 16, 1999.

²⁵² See *id.*

²⁵³ See *id.*

²⁵⁴ *MCI WorldCom to Acquire SkyTel Communications*, News Release, MCI WorldCom, Inc., May 28, 1999.

²⁵⁵ See Brad Smith, *Conxus Builds Out Data Networks*, WIRELESS NETWORK, Jan. 25, 1999, at 20.

²⁵⁶ Telephone Conversation with Hugh Fagan, Director, Investor Relations, Paging Network, Inc. (Apr. 9, 1999).

²⁵⁷ See Antony Bruno, *PageMart Starts Two-Way Service*, RCR RADIO COMMUNICATIONS REPORT, Dec. 21,

canned message response and two-way text messaging sometime in 1999.²⁵⁸

While several carriers have made significant advances in launching services using narrowband PCS spectrum, such services are still in the early stages of deployment. Analysts' projections for the total narrowband subscribers by 2002 ranges from a low of 8.4 million to a high of 24.6 million customers.²⁵⁹

b. Information Services

Based on the belief that information services will provide the product differentiation necessary to compete with other paging carriers and other sectors of the wireless industry, paging companies have spent substantial time and resources developing such offerings. For example, PageNet offers weather updates and customized sports and TV listings to its customers.²⁶⁰ One of the more innovative information services that began in January 1999 was a smog alert notification service in Los Angeles provided jointly by the South Coast Air Quality Management District and several paging carriers. Depending on the outcome of the seven-month trial, it may be offered for a monthly fee of approximately \$7.95.²⁶¹

In an effort to attract non-traditional paging users, Swatch, the wristwatch maker, introduced Swatch the Beep Box, a round pager that comes in three different colors. The pager sells for \$75 alone or as a \$100 prepaid package of three months of service and 1,000 pages.²⁶² SkyTel, the marketer of the prepaid package, notes that with its advanced messaging network gaining high ARPU customers, it is targeting one-way customers in a financially-secure manner (*i.e.*, prepaid).²⁶³ SkyTel also offers its advanced messaging customers a variety of information

1998, at 1.

²⁵⁸ See *id.*

²⁵⁹ Forecast of the Yankee Group (24.6 million). *PCIA Forecast*, at 5. Forecast of The Strategis Group (8.4 million). *Id.* at 6. Forecast of Donaldson, Lufkin & Jenrette (13 million). *DLJ Report*, at 40. Forecast of Paul Kagan Associates, Inc. (11 million). Paul Kagan Associates, Inc., *Wireless Messaging: A \$6.6 Bil. Revenue Business in 1999*, WIRELESS DATA & MESSAGING, Jan. 31, 1999, at 4.

²⁶⁰ See *PageNet, ESPN To Deliver Sports Info To Paging Customers*, WIRELESS TODAY, Nov. 24, 1998, available in 1998 WL 9345527; See Bruce Felps, *PageNet Subs Receive AccuWeather Forecasts*, WIRELESS WEEK, Feb. 1, 1999, at 28; See Brad Smith, *PageNet To Offer Custom TV Listings*, WIRELESS WEEK, Jan. 11, 1999, at 14.

²⁶¹ See *Smog Alerts To Be Issued by Pagers in Test Program*, LOS ANGELES TIMES, Nov. 18, 1998.

²⁶² See *Pager Gets the Swatch Treatment*, BUSINESS WIRE, Nov. 2, 1998.

²⁶³ See Antony Bruno, *Prepaid Services Come To Paging Industry*, RCR RADIO COMMUNICATIONS REPORT,

services, including custom news and Bloomberg financial information.²⁶⁴

4. Competitive Assessment

In the *First*, *Second*, and *Third Reports*, the Commission concluded that the paging segment of the CMRS industry is highly competitive.²⁶⁵ For a number of reasons, the Commission continues to believe that the paging/messaging industry is highly competitive. First, although concentration (based on subscriber share) has increased in the past year due to two large mergers, there are still an average of 29 paging licensees in each of the 25 largest cities in the U.S., not including resellers, and an average of 12 paging licensees in each of the 25 smallest MSAs.²⁶⁶ Second, paging carriers continue to face competition from other sectors of the wireless industry. Third, customers can switch providers at low cost.²⁶⁷ Fourth, while some carriers are in the midst of restructuring and raising the prices of some paging services,²⁶⁸ estimated industry churn is on the rise (4.0 percent compared to 3.0 percent in 1997),²⁶⁹ and one-third of those planning to switch carriers cite rising prices. There is also some evidence that at least for some classes of customers, demand is relatively more price sensitive (*i.e.*, price elastic) as evidenced by customers moving to competitors with lower prices or dropping off the network entirely.²⁷⁰ Finally, ARPU was at a low point last year and has increased in 1998, which is due

Sep. 21, 1998, available in 1998 WL 8227302.

²⁶⁴ See *SkyTel Adds More Specialized Content to Information Services; Services from Datalink.net, INTERACTIVE SPORTS Enhance Level of Customization*, News Release, SkyTel Communications, Inc., Jan. 20, 1999; See *SkyTel Subscribers To Carry Bloomberg On Their Belts; Partnership Features Several Products To Get Key Financial Information To Customers on the Go*, News Release, SkyTel Communications, Inc., Dec. 16, 1998.

²⁶⁵ Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *First Report*, 10 FCC Rcd at 8867-68 (1995) ("*First Report*"); Implementation of Section 6002(b) of the Omnibus Budget Reconciliation Act of 1993, Annual Report and Analysis of Competitive Market Conditions with Respect to Commercial Mobile Services, *Second Report*, 12 FCC Rcd at 11305 (1997); *Third Report*, 13 FCC Rcd at 19804.

²⁶⁶ RCR, RCR'S 1998 PAGING HANDBOOK (1998).

²⁶⁷ See *Strategis Paging Report*, at 75.

²⁶⁸ See *Major Paging Carrier's Financials Take the Street by Surprise*, PAGINGNOW, Feb. 17, 1999 <<http://www.pagingnow.com>>.

²⁶⁹ *Customer Churn Stirs Up Paging Industry*, News Release, The Strategis Group, Nov. 5, 1998.

²⁷⁰ See *Gains Too Modest To Assess Paging Industry's Shift in Marketing*, COMMUNICATIONS TODAY, Nov. 9, 1998, available in 1998 WL 17661712.

in part, analysts believe, to the increased provision of value-added advanced messaging and information services.²⁷¹ Analysts note that such services are offered by carriers in order to differentiate their services in an increasingly competitive market.²⁷²

C. Traditional Dispatch

Dispatch services allow two-way, real-time, voice communications between two or more mobile units (*e.g.*, between a car and a truck) or between mobile units and fixed units (*e.g.*, between the end user's office and a truck). Typical users of dispatch services include service and delivery companies whose operations require their employees to communicate with each other on a private (one-to-one) or group (one-to-many) basis. As mentioned in the introduction, dispatch networks can also be designed to interconnect with the PSTN. Commercial dispatch carriers operate primarily in the 800 MHz, 900 MHz and 220 MHz bands.²⁷³ Commercial dispatch service offered in the 800 MHz and 900 MHz bands is referred to by the Commission as Specialized Mobile Radio ("SMR") service.²⁷⁴

In addition to the dispatch services being provided by SMR and 220 MHz licensees, there are also many PMRS licensees using their licenses to meet their own needs for dispatch services.²⁷⁵ Some of these licensees also offer commercial dispatch services to other customers.²⁷⁶ According to one analyst, there were approximately 15.8 million private mobile radio users in the United States as of year-end 1998.²⁷⁷ However, this report will limit most of its discussion of

²⁷¹ *New Business Climate Envelopes U.S. Paging Industry*, News Release, The Strategis Group, Aug. 5, 1998.

²⁷² *See Wireless Messaging Industry Prepares for Information Explosion*, News Release, PageNet, Nov. 19, 1998; *See Jeanine Oburchay, Wall Street Perspective: Is Paging a Lasting Application?*, PAGINGNOW, Dec. 10, 1998 <<http://www.pagingnow.com>>.

²⁷³ *In re Applications of Pittencrieff Communications, Inc. Transferor and Nextel Communications, Inc. Transferee For Consent to Transfer Control of Pittencrieff Communications, Inc. and its Subsidiaries*, *Memorandum Opinion and Order*, 13 FCC Rcd 8935, 8949 (1997).

²⁷⁴ *See* 47 C.F.R. 90.7.

²⁷⁵ It is also possible that potential customers of dispatch services who are seeking more a interconnected service may also choose to purchase mobile telephone service from a cellular, broadband PCS, or digital SMR operator.

²⁷⁶ Commercial dispatch services are offered by PMRS licensees who can provide dispatch service to others on a for-profit basis and still be classified as PMRS as long as they are not connected to the PSTN. *See First Report*, 10 FCC Rcd at 8861-8863.

²⁷⁷ The Stategis Group, Inc., "Dispatch Service in a Competitive Market," Presentation at AMTEX'98

dispatch services to commercial SMR and 220 MHz licensees.

In the following, "dispatch-only" refers to subscribers who use private or group service only, while "dispatch/interconnect" refers to subscribers who are also able to make calls to the PSTN.²⁷⁸ For purposes of this report, "Dispatch" and "SMR" are used to refer to combined dispatch-only and dispatch/interconnect services in all bands.

1. Commercial Dispatch Market Structure and Performance

In 1998, the commercial dispatch industry's total subscribership increased by 48 percent from 3.1 million to 4.6 million.²⁷⁹ Of the 1998 total, approximately 1.63 million were dispatch-only subscribers.²⁸⁰

The overall structure of SMR industry is more concentrated than other CMRS sectors.²⁸¹ The largest SMR operator is Nextel, with approximately 3.1 million U.S. subscribers, including over 350,000 analog-based, dispatch-only subscribers.²⁸² Nextel served 21 percent of all dispatch-only subscribers; Nextel's total subscribership was 68 percent of all SMR subscribers. The next largest operator was Southern Company, with 100,000 subscribers. The third largest operator was Mobex with 50,000 subscribers. Other significant operators include the Chadmoore Wireless Group, Inc. with 27,000 subscribers and Intek Global with 11,400 subscribers.

While revenue per subscriber for dispatch/interconnect users is much higher than dispatch-only revenue, the differential has been shrinking.²⁸³ Between 1996 and 1998, the ARPU for dispatch-only services rose slightly, from \$16.10 to \$16.40. In contrast, over the same time period, the ARPU for dispatch/interconnect services decreased 22 percent from \$49.40 to \$38.70.

Conference & Exposition, Nov. 13, 1998.

²⁷⁸ It is important to note that operators can offer both services to customers on the same network.

²⁷⁹ See Appendix D, Table 2, p. D-3.

²⁸⁰ The Strategis Group, Inc., "Dispatch Service in a Competitive Market," Presentation at AMTEX'98 Conference & Exposition, Nov. 13, 1998. The Strategis Group estimates that 86 percent of analog subscribers and less than five percent of digital subscribers are dispatch-only.

²⁸¹ See Appendix D, Table 1, p. D-2.

²⁸² Nextel Communications, Inc., Form 10-K, Dec. 31, 1999, at 1. This figure had decreased from 583,000 at the end of 1997. See *Third Report*, at n. 277. Nextel's existing analog SMR operations focus primarily on two-way radio service. Nextel Communications, Inc., Form 10-K405, Dec. 31, 1997, at 14.

²⁸³ See Appendix D, Table 3, p. D-3.

2. Major Trends and Developments

a. Analog Expansion

Even as Nextel has been successfully deploying digital technology in its networks,²⁸⁴ the number of analog subscribers (excluding those served by Nextel) continues to grow.²⁸⁵ While total analog subscribers in the 800 MHz band declined 6 percent in 1998, non-Nextel analog 800 MHz subscribers grew 8 percent. Other analog bands showed even more subscriber growth: analog 220 MHz grew 43 percent, and analog 450 MHz grew 273 percent. Subscriber growth in 1998 for all analog bands was 9 percent. This growth shows the continued demand for cheaper, dispatch-only service that is generally provided by analog operators.²⁸⁶

b. 220 MHz Auction

Due to a variety of factors,²⁸⁷ the 220 MHz band is significantly less encumbered than the 800 and 900 MHz SMR bands.²⁸⁸ Furthermore, the conversion of spectrum to digital services on the 800 and 900 MHz SMR bands, and their higher monthly prices, has led to an increased demand for the less expensive dispatch services both for analog 800 and 900 MHz SMR operators, and

²⁸⁴ Southern Company, which offers its Southern LINC service across 120,000 square miles in the Southeastern United States, is also using iDEN technology in the 800 MHz SMR band. Southern Company, *Service Territory* (visited Feb. 24, 1999) <<http://www.solinc.com/serviceterr.asp>>.

²⁸⁵ See Appendix D, Table 4, p. D-3.

²⁸⁶ See Lynette Luna, *Analog Dispatch Still a Viable Growth Business, Say Operators*, RCR, Oct. 19, 1998, at 15-16. Chadmoore Wireless Group, Inc., for example, is building a nationwide analog SMR network. According to Chadmoore COO Jan Zwaik, "We want to remain analog . . . our vision is to provide cost-effective service." Lynette Luna, *Analog Dispatch Still a Viable Growth Business, Say Operators*, RCR, Oct. 19, 1998, at 15. The capital costs per subscriber associated with digital technology are substantially higher than those for analog systems. Chadmoore Wireless Group, Inc., Form 10QSB/A, filed Nov. 25, 1998.

²⁸⁷ See Amendment of Part 90 of the Commission's Rules To Provide for the Use of the 220-222 MHz Band by the Private Land Mobile Radio Service, *Memorandum Opinion and Order on Reconsideration*, 13 FCC Rcd 14569, 14575-14579 (1998).

²⁸⁸ Caron Carlson, *FCC Prepares 220 MHz Auction*, WIRELESSWEEK, Jan. 12, 1998, at 26; Intek Diversified Corp., Form 10-K, Sep. 30, 1997, at 3. Phase I 220 MHz licensing was conducted by lotteries that awarded approximately 3,800 licenses through random selection. Federal Communications Commission, *220 MHz Fact Sheet* (last modified Jan. 7, 1999) <<http://www.fcc.gov/wtb/auctions/220/220fact.html>>. According to Intek Global Corp., a holder of 220 MHz licenses, the number of currently commercially operational 220 MHz systems is "very small." Intek Global Corp., Form 10-K, Sept. 30, 1998, at 6.

220 MHz operators.²⁸⁹

On October 22, 1998, the Commission completed the Phase II 220 MHz auction,²⁹⁰ raising \$21 million.²⁹¹ Licensees authorized in the Phase II 220 MHz Service are permitted to provide voice, data, paging and fixed communications.²⁹² A reauction of retained (and defaulted) licenses began on June 8, 1999.²⁹³

c. Upper 800 MHz Band

On December 8, 1997, the Commission completed an auction for the upper 200 channels in the 800 MHz SMR band.²⁹⁴ The license holders from that auction are permitted to relocate incumbent licensees to comparable spectrum.²⁹⁵ FCC rules allow a one-year voluntary negotiation period, followed by a one-year mandatory negotiation period between incumbent licensees and Economic Area (EA) licensees. Ultimately, the operators face forced relocation if the new licensee so desires. The voluntary negotiation period began on December 4, 1998.²⁹⁶

²⁸⁹ Intek Global Corp., Form 10-K, Sep. 30, 1998, at 7. "Over the last several years, however, many traditional SMR operators have been acquired by Nextel Communications, Inc. ("Nextel") and have been, or are being, converted to a national ESMR system utilizing digital technology which also provides cellular like service. That consolidation, the Company believes, has left a void in the U.S. market for those subscribers seeking traditional low cost two-way dispatch service."

²⁹⁰ See "Phase II 220 MHz Service Auction Closes: Winning Bidders in the Auction of 908 Phase II 220 MHz Service Licenses," *Public Notice*, DA 98-2143 (rel. Oct. 23, 1998).

²⁹¹ See Appendix A, Tables 1 and 2, p. 2, 3, 5 for a summary of the auction design and a list of high bidders.

²⁹² Federal Communications Commission, *220 MHz Fact Sheet* (last modified Jan. 7, 1999) <<http://www.fcc.gov/wtb/auctions/220/220fact.html>>.

²⁹³ "Phase II 220 MHz Service Spectrum Auction Scheduled for June 8, 1999; Application Filing Deadline Set for May 10, 1999; Comment Sought on Reserve Prices or Minimum Opening Bids and Other Auction Procedures," *Public Notice*, DA 98-2386 (rel. Nov. 24, 1998). See also "Phase II 220 MHz Service Spectrum Auction; Notice and Filing Requirements for Auction of Phase II 220 MHz Service Spectrum Scheduled for June 8, 1999," *Public Notice*, DA 99-474 (rel. Mar. 8, 1999).

²⁹⁴ "800 MHz SMR Auction Closes, Winning Bidders In The Auction of 525 Specialized Mobile Radio Licenses," *Public Notice*, DA 97-2583 (rel. Dec. 9, 1997).

²⁹⁵ 47 C.F.R. §90.699.

²⁹⁶ "Wireless Telecommunications Bureau Announces the Commencement of the Voluntary Negotiation Period for the Relocation of Incumbent Licensees in the 800 MHz Band," *Public Notice*, DA 98-2434 (rel. Dec. 4, 1998). The license winner must contact the incumbents by March 4, 1999 to begin negotiations.

Some uncertainty regarding the 800 MHz licenses dissipated in early February 1999 when the U.S. Court of Appeals for the District of Columbia determined that the Commission was within its statutory authority to auction wireless spectrum to provide SMR services and to use its plan to relocate incumbents.²⁹⁷

d. Geotek Bankruptcy and Nextel

Geotek Communications, Inc. ("Geotek"), an SMR operator that used its own patented technology in the 900 MHz band to provide a range of telecommunications services to small- and medium-size businesses with mobile fleets of vehicles, filed for Chapter 11 bankruptcy protection on June 29, 1998.²⁹⁸ Although it originally planned to reorganize, Geotek announced in October that it was shutting down its SMR operations.²⁹⁹

On February 12, 1999, Nextel announced that it planned to buy all of Geotek's 191 900 MHz licenses³⁰⁰ for \$150 million, pending regulatory approval.³⁰¹ Four days later, Nextel and Geotek received permission for the transaction from the Delaware Bankruptcy Court.³⁰² The following

²⁹⁷ Fresno Mobile Radio, Inc. v. FCC, 165 F.3d 965 (D.C.Cir. 1999)

²⁹⁸ Geotek Communications, Inc., Form 10-K, Dec. 31, 1996, at 2. In addition to traditional mobile telephone and one-to-many dispatch services, Geotek also offered a range of mobile messaging, mobile data and vehicle location services. Geotek Communications, Inc., Form 10-K, Dec. 31, 1996, at 3. As recently as January 1998, Geotek was operating in 11 markets and had 15,151 subscribers. *Geotek Reports Year End Subscriber Growth*, News Release, Geotek Communications, Inc., Feb. 5, 1998. By June 1998, however, Geotek had insufficient cash to fund operations. *Geotek to Cease Operations Later This Month*, WIRELESS TODAY, Oct. 2, 1998.

²⁹⁹ *Geotek to Cease Operations Later This Month*, WIRELESS TODAY, Oct. 2, 1998.

³⁰⁰ Geotek's licenses cover a potential market population of 200 million people and include a number of major metropolitan areas: Atlanta; Birmingham, Ala.; Boston; Charlotte, N.C.; Cincinnati, Ohio; Milwaukee, Wis.; New York City; Philadelphia; Portland, Ore.; Richmond, Va.; Washington, D.C.; Jacksonville and Miami, Fla.; San Antonio, Houston and Dallas, Texas; Spokane and Seattle, Wash.; and Tulsa and Oklahoma City, Okla. *Nextel To Acquire Geotek's Licenses For \$150 Million*, COMMUNICATIONS TODAY, Feb. 16, 1999; Federal Communications Commission, *Final Results for All Markets (Excel Ver. 4)* (Visited Mar. 22, 1999)<<http://www.fcc.gov/wtb/auctions/smr/7markets.xls>>.

³⁰¹ *Nextel Requests Lift of Consent Decree to Buy Geotek's 191 900 MHz Licenses for \$150 Million*, LAND MOBILE RADIO NEWS, Feb. 19, 1999. Other bidders included Mobex Communications, Chadmoore Wireless Group, Industrial Communications & Electronics Inc., Southern Co., and FleetTalk Partners. Jeffrey Silva, *Geotek Bankruptcy Sale Reset for Tuesday*, RCR RADIO COMMUNICATIONS REPORT, Feb. 15, 1999.

³⁰² *Nextel Requests Lift of Consent Decree to Buy Geotek's 191 900 MHz Licenses for \$150 Million*, LAND MOBILE RADIO NEWS, Feb. 19, 1999.

day, Nextel filed suit in the U.S. District Court for the District of Columbia to lift the consent decree limiting its holdings in the 900 MHz band.³⁰³ On June 14, 1999, Nextel reached agreement with the Department of Justice for an out of court settlement.³⁰⁴ Under the agreed terms of the settlement, which is subject to court approval, Nextel will be permitted to acquire ownership of or rights to use more than half (108 of the available 200) of the 900 MHz channels allocated for specialized mobile radio and other uses in the consent decree markets.³⁰⁵

D. Mobile Wireless Data Services

Analysts estimate that more than 70 million Americans over age sixteen log onto the Internet every day and in 1998 spent \$7.8 billion via the Internet.³⁰⁶ Further, worldwide sales of handheld computing devices (sometimes referred to as personal digital assistants ("PDAs")),³⁰⁷ used by many mobile users to access the Internet, grew by over 61 percent between 1997 and 1998.³⁰⁸ The wireless industry is attempting to capture a portion of the revenues generated by sales of telecommunications services used to access the Internet, e-mail, and corporate intranets through mobile wireless data services.³⁰⁹

Wireless carriers are entering mobile data markets by providing new services, and equipment

³⁰³ In 1995, Nextel and its supplier, Motorola Inc., signed a consent decree with the Department of Justice to obtain approval of 900 MHz license transfers from Motorola to Nextel. The consent decree limits the number of licenses each company can use in the top 14 U.S. markets. Several of the Geotek licenses fall in this category and Nextel's acquisition of the license would place it in violation of the decree. Nextel offered \$100 million for Geotek licenses covering spectrum restricted by the consent decree, and \$50 million for the remaining licenses. Caron Carlson, *Mobex, Nextel Spar Over DOJ Decree*, WIRELESS WEEK, Feb. 22, 1999.

³⁰⁴ *Nextel to Be Freed to Utilize 900 MHz Spectrum to Expand iDEN Network*, News Release, Nextel Communications, Inc., June 14, 1999. Nextel would also need Commission approval for the license transfers.

³⁰⁵ *Nextel to Be Freed to Utilize 900 MHz Spectrum to Expand iDEN Network*, News Release, Nextel Communications, Inc., June 14, 1999. The entire consent decree, and any associated restrictions on Nextel's utilization of additional 900 MHz channels in these markets, will terminate on October 30, 2000. *Id.*

³⁰⁶ Brad Smith, *Wireless Wakes up To E-Commerce*, WIRELESS WEEK, Feb. 1, 1999, at 66.

³⁰⁷ For example, 3Com manufactures the PalmPilot Professional. See 3Com Corporation, *3Com/Palm Computing - PalmPilot™ Professional Edition Organizer* (visited Feb. 19, 1999) <<http://www.palm.com/products/palmpilotpro.html>>.

³⁰⁸ *GartnerGroup's Dataquest Says Worldwide Handheld Market Grew 61 Percent in 1998*, News Release, Dataquest Inc., Feb. 8, 1999.

³⁰⁹ For a discussion of fixed wireless data services, see Appendices F and G.

manufacturers have responded with a plethora of new devices.³¹⁰ For example, digital handsets range from a simple keypad phone with limited data capabilities to newer products such as QUALCOMM's pdQ "smart" phone with built-in PDA and access to the Internet.³¹¹ In addition, several joint ventures have been announced to develop and market bundled information services and establish Internet protocol ("IP") transmission standards to facilitate communication between various types of networks and technologies. These ventures are discussed below.

This section begins with a description of mobile data providers, followed by joint ventures and industry trends and statistics.

1. Mobile Data Providers

Due to different technologies and spectrum, the mobile wireless data industry encompasses a wide array of services ranging from data transmitted over one-way pagers to vehicle tracking from satellites to wireless Internet connections via portable computers or PDAs. Participants include both CMRS and non-CMRS providers.³¹² The Commission recognizes that many of the providers discussed below also offer services that were addressed in the preceding three sections. However, because the industry is still evolving, the Commission believes it is appropriate to address mobile data services as a separate section. For discussion purposes, carriers providing mobile wireless data services can be grouped into four general network types: 1) paging/messaging networks, 2) voice/data networks, 3) dedicated data networks, and 4) satellite networks.³¹³

As noted in the *Third Report*, the use of categories does not imply that the Commission's view of operators and services is limited by the category in which this discussion places them. Many networks are capable of providing similar services, and this report attempts to provide a broad overview of the types of services a given network may provide. As it is unlikely that consumers would be concerned about which network is used to provide mobile wireless data services, these categories have been established merely to facilitate the presentation. Furthermore, because

³¹⁰ See, e.g., *HP Introduces First Color Palm-Size PC Running Microsoft Windows CE*, News Release, Hewlett-Packard Company, Feb. 1, 1999.

³¹¹ See QUALCOMM Incorporated, 1998 Annual Report, at 14. The product is expected to be available in 1999. See *id.*

³¹² See THE BISHOP COMPANY, WIRELESS DATA NETWORKS, A GUIDE TO MOBILE COMPUTING (1998), at 18. ("*Bishop Report*")

³¹³ Examples of the types of services provided over these networks are summarized below. For a more complete delineation of the networks and services, see Appendix D, Table 1, p. D-1.

these services are evolving in many different ways, it is not clear at this time into which market sector these services will be placed in the future.

a. Paging/Messaging Networks

As discussed in Section 0, one-way paging companies provide a variety of subscriber information services such as e-mail, sports scores, and customized web site information. These services are ubiquitous in coverage and relatively less expensive for customers compared to some other wireless mobile data services discussed below. However, the volume and speed of the data sent are limited. Many paging carriers offer some form of information services.³¹⁴ In addition to receiving information on the screens of traditional pagers, paging subscribers can receive one-way data to download to a laptop or PDA. PageMart markets a receiver that connects to the 3Com PalmPilot.³¹⁵

Narrowband PCS services permit higher speed transmissions of data and also allow subscribers to respond.³¹⁶ Narrowband PCS providers are also capable of providing wireless modem functions similar to packet-switching data services discussed below.³¹⁷

b. Voice/Data Networks

In addition to voice services, mobile telephone carriers provide a variety of data services over analog cellular data networks, as well as digital cellular, broadband PCS, and digital SMR networks.

(1) Analog Cellular Networks

Analog cellular carriers offer circuit-switched cellular data ("CSCD") services. CSCD service requires two computers connected continuously throughout the session. The mobile telephone connects to a modem, that transmits data via an air link to a nearby cell and through the public switched network to the other computer.³¹⁸ Providers include AirTouch, ALLTEL, and Comcast

³¹⁴ For a further discussion, *see* Section 0.

³¹⁵ *See Bishop Report*, at 46-47.

³¹⁶ For a discussion of services offered by narrowband PCS providers, *see* Section 0 and Appendix C, Table 8, p. C-9.

³¹⁷ *See Bishop Report*, at 50.

³¹⁸ *See id.*, at 22.

Cellular, among others.³¹⁹

Cellular networks also provide a packet-switched data transmission service called Cellular Digital Packet Data ("CDPD") service over the existing analog network by installing certain upgrades.³²⁰ The main difference between CDPD and CSCD is that CDPD does not require a continuous connection. Therefore, certain types of transmissions can be more efficient since CDPD does not continuously tie up the transmission path. Circuit-switched CDPD ("CS-CDPD") was developed to expand the coverage of CDPD by allowing users to access the data network wherever analog cellular voice service is available.³²¹ Most large cellular carriers offer CDPD.³²² While prices were originally based on the amount of data throughput, carriers have begun offering CDPD service on a flat rate basis for under \$60 per month.³²³ As of the end of the third quarter of 1998, CDPD was available to more than 55 percent of the population, up slightly from 53 percent coverage at the end of the third quarter of 1997.³²⁴

(2) Digital Mobile Telephone Networks

Digital cellular, broadband PCS, and digital SMR mobile telephone providers are capable of providing short messaging services ("SMS"),³²⁵ as well as circuit-switched and packet-switched data transmission.³²⁶ SMS can be either one- or two-way text messaging provided to the mobile handset and may include e-mail as well as text Internet information.³²⁷ Currently, most digital

³¹⁹ See *RCR's Top 20 Mobile Data Carriers*, RCR RADIO COMMUNICATIONS REPORT, Sep. 7, 1998, at 16.

³²⁰ Installation of CDPD requires a special signal processor in each cell site to detect and route packet data. *Bishop Report*, at 54. See also HARRY NEWTON, NEWTON'S TELECOM DICTIONARY (14th ed. 1998), at 140. CDPD can also run over TDMA and CDMA networks. *Id.*

³²¹ See Shawn Steward, *A circuitous route to CDPD expansion*, CELLULAR BUSINESS, Sep. 1, 1996, available in 1996 WL 9781930.

³²² See Wireless Data Forum, *CDPD Report Card Third Quarter 1998* (visited Feb. 23, 1999) <<http://www.wirelessdata.org/maps/index.asp>>; *Third Report*, 13 FCC Rcd at 19811.

³²³ See *Bishop Report*, at 56.

³²⁴ Wireless Data Forum, *CDPD Report Card Third Quarter 1998* (visited Feb. 23, 1999) <<http://www.wirelessdata.org/maps/index.asp>>; *Third Report*, 13 FCC Rcd at 19811. Appendix H, Map 9, p. H-10 shows the estimated U.S. coverage of CDPD.

³²⁵ For example, AT&T Wireless, Sprint PCS, Omnipoint, and Nextel offer SMS.

³²⁶ See footnote **Error! Bookmark not defined.**

providers' data offerings are limited to short messaging services.³²⁸

Only GSM- and iDEN-based providers actively offer circuit-switched wireless data communications, permitting subscribers to send and receive e-mail, faxes, and files from their mobile phones.³²⁹ However, it is believed that once their voice networks are built out, mobile phone providers using CDMA and TDMA technologies will also provide these services.³³⁰ The Nokia 9000 and 9110 "smart" phones combine a GSM handset and keyboard that will send and receive faxes and e-mail using circuit-switched transmission, send and receive messages using short messaging service, and browse text web sites.³³¹ Ericsson recently launched the first GSM-based mobile telephone that combines a built-in modem with an infrared eye that eliminates the need for cables.³³² Omnipoint offers circuit-switched data

³²⁷ One source indicates that some analog cellular networks have upgraded their systems to offer SMS. The networks use a digital control channel rather than an analog control channel. *See Bishop Report*, at 18.

³²⁸ *See Bishop Report*, at 18, 36.

³²⁹ *See id.*, at 36, 83.

³³⁰ *See id.*

³³¹ *See id.*, at 38.

³³² *See* Gayle Bryant, *The Future in the Palm of Your Hand*, BUSINESS REVIEW WEEKLY, Dec. 7, 1998, available in 1998 WL 11773575.

transmission over its GSM network.³³³ In addition, Southern LINC, a digital SMR provider using the iDEN network also provides circuit-switched data services.³³⁴ While QUALCOMM produces equipment permitting data transmission over CDMA networks, no domestic CDMA providers yet offer such services.³³⁵ Wireless digital data services that are in the testing or planning phase, such as packet-switched communications, are discussed below.

Finally, as discussed above in Section 0, the ITU is developing recommendations for the IMT-2000 initiative which will include mobile wireless data services. It is anticipated that systems based on 3G technology will offer greatly enhanced data capabilities, and will begin to converge differing regional or national mobile systems into a radio infrastructure capable of providing those services on a global basis.³³⁶

c. Dedicated Data Networks

A number of wireless networks provide only data services. ARDIS, BellSouth Wireless Data, Inc. ("BWD") and Metricom, Inc. ("Metricom") use packet-switched data networks to provide a variety of wireless data services. ARDIS provides two-way data communications primarily to businesses in field services and transportation markets.³³⁷ BWD provides services such as field sales and service through its Mobitex network, and several third-party providers package Mobitex with other software and services to provide access to e-mail, corporate intranets, and the Internet.³³⁸ BWD began providing Internet e-mail service last year over its two-way messaging network.³³⁹ The service permits messages up to 2700 words.³⁴⁰ In addition, Palm Computing

³³³ See Brad Smith, *Omnipoint Leads GSM Data Pack*, WIRELESS WEEK, Mar. 22, 1999, at 19. Omnipoint announced it would begin offering high-speed circuit-switched data at a base rate of 14.4 kbps (versus the previous 9.6 kbps) beginning April 1, 1999. See *id.*

³³⁴ See Southern Company, *Southern LINC - Features* (visited Feb. 11, 1999) <<http://www.solinc.com/features.asp#mobile>>.

³³⁵ See *Bishop Report*, at 40.

³³⁶ *Id.*

³³⁷ American Mobile Satellite Corporation, Form 10-K, Dec. 31, 1998, at 2. See Appendix H, Map 12, p. H-13 for American Mobile Satellite Corporation's ARDIS coverage.

³³⁸ BellSouth, *BellSouth Wireless Data - Corporate Information* (visited Mar. 24, 1999) <<http://www.bellsouthwd.com/abo/index.html>>. See also BellSouth, *BellSouth Wireless Data - Messaging* (visited Mar. 25, 1999) <<http://www.bellsouthwd.com/sol/messaging/solutions.html>>. See Appendix H, Map 11, p. H-12 for BWD's coverage.

³³⁹ See Brad Smith, *Data Finally Reaching Its Potential*, WIRELESS WEEK, Feb. 8, 1999, at 40.

has announced it will provide Internet services to its Palm VII PDA using BWD's network.³⁴¹

Metricom uses unlicensed spectrum. The company provides access to the Internet, e-mail, LANs, on-line services, and private intranets through its Ricochet service. The company is in the process of testing its upgraded network permitting data transmission speeds up to 128 Kilobits per second ("Kbps") as compared to its current network speed of 28.8 Kbps.³⁴²

Ricochet coverage currently includes the San Francisco Bay Area; Seattle and Washington, D.C.; parts of Los Angeles and New York City; and several campuses and airports.³⁴³ As of February 28, 1999, Metricom had 26,500 Ricochet customers.³⁴⁴

Teletrac, Inc. ("Teletrac") also uses unlicensed spectrum to provide vehicle location³⁴⁵ and fleet management services in thirteen metropolitan areas.³⁴⁶ Teletrac has over 2,400 commercial customers and more than 80,000 commercial and consumer units in operation.³⁴⁷

³⁴⁰ See *The Best Is Yet To Come - A Look Back at the Year in Wireless Data*, WIRELESS DATA NEWS, Dec. 9, 1998, available in 1998 WL 8015476.

³⁴¹ See Brad Smith, *Data Finally Reaching Its Potential*, WIRELESS WEEK, Feb. 8, 1999, at 40.

³⁴² *Metricom Deploys Industry's First 128KB Mobile Data Network*, News Release, Metricom, Inc., Mar. 16, 1999; Metricom, Inc., *Metricom Inc. Frequently Asked Questions* (visited Mar. 17, 1999) <<http://www.ricochet.net/faq/faq.htm>>.

³⁴³ Metricom, Inc., Form 10-K, Dec. 31, 1998, at 2; *New York City Goes Mobile with Metricom*, News Release, Metricom, Inc., Apr. 6, 1999.

³⁴⁴ Metricom, Inc., Form 10-K, Dec. 31, 1998, at 2. See Appendix H, Map 12, p. H-13 for Metricom's Ricochet coverage.

³⁴⁵ The Commission recently completed its Location Monitoring Service ("LMS") Auction which permits license holders to utilize non-voice radio techniques to determine the location and status of mobile radio units. See *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, Second Report and Order*, PR Docket No. 93-61, 13 FCC Rcd 15,182 (1998). LMS auction results are provided in Appendix A, Table 4, p. A-6.

³⁴⁶ Teletrac, Inc., *Corporate Information* (visited Mar. 17, 1999) <<http://www.teletrac-online.com/company/htm/corpinfo.htm>>; Teletrac, Inc., *Availability* (visited Mar. 17, 1999) <<http://www.teletrac-online.com/products/htm/availabl.htm>>.

³⁴⁷ *Id.*

d. Satellite Services

A number of satellite providers offer mobile data services. The paging/messaging offerings of satellite providers were discussed above in Section 0. In addition, QUALCOMM and American Mobile provide vehicle tracking services.³⁴⁸ As of December 31, 1998, American Mobile had approximately 92,700 terrestrial (*i.e.*, ARDIS) and satellite data units.³⁴⁹ ORBCOMM offers mobile asset tracking for trailers, containers, rail cars, heavy equipment, fishing vessels, barges and government assets.³⁵⁰

2. Joint Ventures

Some analysts believe that wireless data will serve only niches until the market addresses specific network and standards issues.³⁵¹ To begin to address issues related to proprietary networks and incompatible standards, mobile wireless data providers have announced a number of joint ventures to develop and market wireless data applications that are compatible with multiple networks and standards. Many of these joint ventures are competing against one another.³⁵² Three of the most prominent ventures³⁵³ include the Wireless Access Protocol ("WAP") Forum,³⁵⁴ Wireless Knowledge, LLC,³⁵⁵ and Bluetooth.³⁵⁶ While all of these

³⁴⁸ QUALCOMM Incorporated, Form 10-K405, Sep. 28, 1997, at 9; American Mobile Satellite Corporation, Form 10-K, Dec. 31, 1997, at 2.

³⁴⁹ American Mobile Satellite Corporation, Form 10-K, Dec. 31, 1998, at 2.

³⁵⁰ ORBCOMM Global, L.P., Form 10-K, Dec. 31, 1998, at 3.

³⁵¹ See Brad Smith, *Data Finally Reaching Its Potential*, WIRELESS WEEK, Feb. 8, 1999, at 38; see also Gayle Bryant, *The Future in the Palm of Your Hand*, BUSINESS REVIEW WEEKLY, Dec. 7, 1998, available in 1998 WL 11773575.

³⁵² See *The Best Is Yet To Come - A Look Back at the Year in Wireless Data*, WIRELESS DATA NEWS, Dec. 9, 1998, available in 1998 WL 8015476.

³⁵³ Other ventures include announcements by Motorola Inc. and Cisco Systems Inc. to partner to provide wireless Internet access and Nextel and Netscape announcing the planned development of an Internet browser for Nextel's digital network. See *WirelessNow News Item: Recent Deals Foretell Wireless Data Success* (visited Feb. 11, 1999) <<http://www.commnw.com/protectwn/a...sponse=articledetail.lasso&-search>>.

³⁵⁴ WAP includes over 75 percent of the handset manufacturers and carriers representing over 100 million subscribers worldwide. WAP is developing a set of standards for wireless transmission over the Internet. See *Open Wireless Internet Standard Backed by 71 Companies Worldwide*, News Release, WAP Forum, Nov. 11, 1998. The WAP Forum indicates that the specification will be vendor-neutral and network-independent and will provide worldwide wireless Internet access from handheld devices. See *id.*

initiatives have contributed to changes in the services and equipment offered by mobile wireless data providers, it is not clear, at this point, what impact these initiatives will have on market growth.³⁵⁷

3. Industry Trends and Statistics

a. Subscribers and Revenues

One analyst estimates that there were almost three million business mobile data subscribers at year-end 1998, an increase of more than 41 percent over year-end 1997.³⁵⁸ Based on 1997 forecasts, revenues from business mobile data subscribers were estimated to be \$535 million at year-end 1998, a 42 percent increase over year-end 1997.³⁵⁹ In addition, based on a survey of ten wireless carriers, the Wireless Data Forum reports that wireless data revenues increased 63 percent in the twelve months ending June 30, 1998.³⁶⁰

b. Prices

Mobile wireless data services are highly differentiated, in part due to the specific mobile wireless

³⁵⁵ WirelessKnowledge LLC, a joint venture between Microsoft and QUALCOMM was formed to offer carriers secure wireless access to data and applications on any wireless device, network, or enterprise system including CDMA, GSM, TDMA, and CDPD. See Brad Smith, *BT Joins Data Venture*, WIRELESS WEEK, Feb. 8, 1999, at 1. The venture introduced its first product in January 1999. See Antony Bruno, *WirelessKnowledge Debuts First Product*, RCR RADIO COMMUNICATIONS REPORT, Jan. 25, 1999, at 7.

³⁵⁶ Ericsson, IBM, Intel, Nokia, and Toshiba announced the formation of Bluetooth, a technology specification that will permit subscribers to transmit data from wireless network to wireless network and from any location without regard to wireless phone or other equipment standards. See Bluetooth, *Welcome to Bluetooth Text Only_FAQ* (visited Feb. 3, 1999) <<http://www.bluetooth.com/faq/index.asp>>.

³⁵⁷ See Erich Luening, *Major Move Toward Wireless Standard*, May 20, 1998 (visited Feb. 3, 1999) <<http://www.news.com/News/Item/0,4,22326,00.html?owv>>.

³⁵⁸ The forecast by The Strategis Group (2.9 million) was completed in 1997 and there is no updated Strategis forecast available. THE STRATEGIS GROUP, *THE U.S. MOBILE DATA MARKETPLACE: 1997* (1997), at 353. ("*Strategis Mobile Data Report*") In addition, The Yankee Group forecasts 2.95 million subscribers at year-end 1998. *PCIA Forecast*, at 73.

³⁵⁹ The forecast by The Strategis Group was completed in 1997 and there is no updated Strategis forecast available. *Strategis Mobile Data Report*, at 353.

³⁶⁰ Wireless Data Forum, *WDF: Wireless Data Market Index* (visited Feb. 2, 1999) <<http://www.wirelessdata.org/index/carrier/index/asp>>.

services offered based on the bandwidth or transmission capacity and the geographic coverage of their networks.³⁶¹ Therefore, a direct comparison of prices is not particularly useful. The *Third Report* contains a table showing prices of sample e-mail and data transmissions.³⁶² That information has not changed substantially and continues to show a wide variation in prices depending on the technology employed,³⁶³ although several of the technologies now offer flat-rate services.³⁶⁴

c. Subscriber and Revenue Market Share by Network

Subscriber and revenue market share breakdowns by carrier are not available. However, based on an analysis completed in 1997, one analyst estimates that as of year-end 1998 cellular and broadband PCS would have approximately 56 percent of the mobile data business subscribers, two-way messaging would have 17 percent, dedicated data networks and mobile satellite services would have 10 percent each, and SMR would have 7 percent.³⁶⁵ The respective share of revenues is quite different. Mobile satellite services would have 33 percent of mobile data business revenues, dedicated data networks would have 26 percent, cellular/broadband PCS would have 20 percent, two-way messaging would have 18 percent, and SMR would have 3 percent.³⁶⁶

d. Innovation

Many carriers are attempting to enter the mobile wireless data market to provide value-added services that would differentiate their products from competitors. Around the time of CTIA's Wireless '99 Conference a number of companies many product announcements for mobile wireless data services and equipment. For example, Sprint, Lucent, US WEST, and QUALCOMM all announced Internet offerings in the near future.³⁶⁷ QUALCOMM has also

³⁶¹ For additional information, see Appendix D, Table 1, p. D-1.

³⁶² *Third Report*, 13 FCC Rcd at 19813-14.

³⁶³ See *Bishop Report*. The report indicates that there have been a couple of per transmission price changes. Geostationary prices have fallen from \$10.50 to \$7.15 for a sample data transfer and \$3.00 to \$1.20 for a sample e-mail. *Id.* at 92. Similarly, the Little Low Earth Orbiting satellite system price for a sample e-mail have fallen from \$6.00 to \$5.00. *Id.* at 103.

³⁶⁴ See e.g., *Bishop Report*, at 77.

³⁶⁵ *Strategis Mobile Data Report*, at 329.

³⁶⁶ *Id.*

³⁶⁷ See Steve Rosenbush, *Wireless Phones Tap into Web Sprint Introduces Faster Service*, USA TODAY, Feb.

announced the availability of the pdQ "smart" phone with personal scheduling software and access to e-mail and the Internet by mid-1999.³⁶⁸

In addition, Ericsson began field testing its TDMA digital data and fax software and infrastructure during the first quarter of 1999. The service permits TDMA subscribers to combine a laptop computer or PDA with a digital data-capable mobile phone to provide access to the Internet, e-mail and intranets.³⁶⁹

Finally, Pacific Bell Wireless is in the process of testing a "GSM on the Net" wireless IP-based multimedia service with Ericsson,³⁷⁰ and Omnipoint is testing a packet-switched platform with Ericsson.³⁷¹ In June 1999, Nextel began trialing a wireless Internet service in six cities.³⁷²

These announcements, along with the joint ventures indicate that the industry is attempting to expand. In addition, the IMT-2000 initiative discussed above is expected to positively impact growth. However, at this early stage, it is not clear how quickly or in which direction the market will likely evolve.

III. CONCLUSION

In the year since the release of the *Third Report*, the mobile telephone market has made steady competitive progress. There are now over two dozen broadband PCS and digital SMR operators providing competition in numerous cities across the country. As a result of these operators' activities, there are now three or more mobile telephone operators providing some service in over 230 BTAs, containing over 230 million people. Furthermore, there are a minimum of five operators providing some service in each of the 35 largest BTAs. These new entrants (and

16, 1999, available in 1999 WL 6834456. Sprint plans to offer Internet access at 14.4 kbps by June 1999. Lucent will test Internet access at 144 kbps later this year, and US WEST and QUALCOMM will run a similar test in April. See *id.*

³⁶⁸ See QUALCOMM Incorporated, 1998 Annual Report, at 14.

³⁶⁹ See *Ericsson Announces Digital Data and Fax for TDMA Networks*, BUSINESS WIRE, Feb. 8, 1999.

³⁷⁰ See Madeleine Acey, *PacBell and Ericsson Test 'GSM On The Net,'* CMP TECHWEB, Feb. 17, 1999, available in 1999 WL 2493490.

³⁷¹ See Sylvia Dennis, *Ericsson & Omnipoint To Stage First GPRS Trial in US*, NEWSBYTES NEWS NETWORK, Feb. 9, 1999, available in 1999 WL 5118856. Omnipoint indicates that it plans to launch packet-based services by the end of 1999. See Brad Smith, *Omnipoint Leads GSM Data Pack*, WIRELESS WEEK, Mar. 22, 1999, at 19.

³⁷² *Nextel Digital Wireless Internet Service*, ZSIGO NEWZWIRE, Apr. 27, 1999.

incumbents) are not subject to rate and entry regulation and are being provided ever increasing regulatory flexibility to allow them to compete effectively.

While there is still considerable room for further competitive development, the effects of the progress to date are clear. For example, according to one study the average price per minute of mobile telephone service declined over 40 percent between the end of 1995 and the end of 1998.

At the same time, usage of these new services remains high, with many digital customers using over 300 minutes, and as high as 400 minutes, each month. This is three times the average of analog cellular customers. While these are welcome developments, there is still much progress that remains to be made. Most operators have still been concentrating their deployment of new mobile telephone networks on more densely populated urban and suburban markets. While many of these operators are now starting to turn their attention toward smaller cities, many less populated areas are still awaiting the arrival of mobile telephone competition.

The year since the release of the *Third Report* has seen the paging/messaging sector remain a highly competitive business with numerous providers in each market. The continued competitive threats from other service providers, such as mobile telephone, mobile data and even satellite providers, have encouraged paging operators to continue to enhance and expand their product offerings with two-way messaging, voice messaging, and enhanced data services, such as e-mail and stock quotes.

Given that the dispatch sector is in the process of restructuring, caused by both Nextel's move into the mobile telephone market and the completion of the 800 MHz SMR and 220 MHz spectrum auctions, a definitive statement as to its competitive status is difficult to make in this report. Similarly, the developmental stage of the mobile data sector makes it difficult to assess its competitive status.

IV. ADMINISTRATIVE MATTERS

This Fourth Report is issued pursuant to authority contained in Section 332 (c)(1)(C) of the Communications Act of 1934, as amended, 47 U.S.C. § 322 (c)(1)(C).

It is ORDERED that the Secretary shall send copies of this Report to the appropriate committees and subcommittees of the United States House of Representatives and the United States Senate.

FEDERAL COMMUNICATIONS COMMISSION

Magalie Roman Salas
Secretary